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Evaluation of the Urban Living Labs in Alby and Peltosaari

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Social uplifting and modernization of suburban areas with Urban Living Lab approach
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Evaluation of the Urban Living Labs in Alby and Peltosaari

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1 EXECUTIVE SUMMARY

Across Europe, some 200 million people live in suburbs in great need of modernization and social uplifting. The JPI Urban Europe SubUrbanLab project (2013-2016) has examined how these suburbs can be modernized and socially uplifted together with the residents and other stakeholders. The project developed and set up six Urban Living Labs (ULLs): three in Alby, Sweden and three in Peltosaari, Finland. These ULLs were arenas for co-creation of innovative urban solutions: a means to develop new forms of experiences on involving the residents and stakeholders into development in an urban context. The long-term goal is to turn these suburbs into more attractive, sustainable and economically viable urban areas.

This report presents the evaluation of the six Urban Living Labs with regard to their impact on sustainability in Alby and Peltosaari. The report also discusses how well each ULL has lived up to the project definition of an Urban Living Lab.

The evaluations show that the impact on sustainability has been varied. Evaluations focused particularly on the social dimension of sustainability, in line with the ULLs themselves, although it covers the environmental and economic dimension as well. Since the ULLs have been small-scale, contribution to sustainability has also been small-scale However, if the ULLs were to be developed further and up-scaled to other suburbs, the ULLs have the potential for a more significant impact on sustainability, both short-term and long-term.

The evaluations further reveal that the ULLs have lived up to the project definition to different degrees. Some joint challenges with the ULL approach can be identified. For example, most of the ULLs struggled with the involvement of users and stakeholder, especially in the earlier phases of developing and planning the ULL. Although the ULLs have integrated a variety of stakeholders and organizations in the co-development of new solutions and ideas, few lived up to the feature of having the *users* of the developed solutions and ideas as active partners during the entire processes. The development and planning process of the ULL integrated to a larger extent stakeholders (other than users) while users were more involved in the implementation and evaluation process. It should be noted that, although ideal, it is often not practically possible (or motivated) to include all relevant users and stakeholders in all stages of an ULL. For example, it can difficult to know beforehand who are the most relevant users and stakeholders but also, as evident in SubUrbanLab, difficult to get a long-term commitment to the ULL already from the start. However, one can raise the question if the Alby and Peltosaari ULLs would have had developed differently if it were possible to engage more users and stakeholders at an earlier stage in the process.

Other conclusions and lessons learned include a request of development of evaluation approaches to evaluate social sustainability and demonstrating cost effectiveness of an ULL and an understanding of the impact of the decision-making structures of public sector on the ULL process and function.

The presented results are primarily of interest for stakeholders interested in developing and establishing Urban Living Labs, as well as researchers on Urban Living Lab approach and other participatory approaches.

2 INTRODUCTION

2.1 SubUrbanLab project

Across Europe, some 200 million people live in suburban areas in great need of modernisation and social uplifting. The SubUrbanLab project (2013-2016) aims to examine how these areas can be modernised and socially uplifted together with the residents and other stakeholders in order to turn into more attractive, sustainable and economically viable suburban areas.

The project has developed and set up so called Urban Living Labs (ULL), i.e. arenas for innovation and dialogue that focuses on solving challenges in the urban area by involving residents and other stakeholders, in connection to needed modernization actions in one suburb in Sweden (Alby in Botkyrka municipality) and one suburb in Finland (Peltosaari in the City of Riihimäki). In total six Urban Living Labs have been set up, three in each suburb. Within the Urban Living Labs, residents and other stakeholders have been involved, using e.g. online tools, social media and face-to-face meetings, in developing and implementing innovative solutions to increase the social, economic and environmental sustainability in these areas in great need of modernisation and social uplifting. This report presents the evaluation of the six Urban Living Labs and their impact on sustainability in Alby and Peltosaari. The report also discusses how well each ULL has lived up to the definition of an Urban Living Lab.

The project team will also, in a later report, assess the potential of the Urban Living Labs for up-scaling across Europe.

Project partners are: IVL Swedish Environmental Research Institute (IVL), Botkyrka municipality, VTT Technical Research Centre of Finland (VTT) and City of Riihimäki.

The project is funded by VINNOVA and Tekes through Joint Programming Initiative – Urban Europe.

2.2 Purpose and target group

The purpose of this report is to summarize and disseminate the evaluation of the six Urban Living Labs carried out as part of the SubUrbanLab project.

The presented results are primarily of interest for other stakeholders interested in establishing Urban Living Labs, as well as researchers on Urban Living Lab methodologies and the project partners in the SubUrbanLab project.

2.3 Contributions of partners

This report has been produced by Anja Karlsson (IVL), Maija Federley (VTT), Elin Bonnier (IVL), Katarina Buhr (IVL), Riikka Holopainen (VTT) and Pekka Tuominen (VTT). All project partners have provided valuable input to the report. A special thanks goes out to Ilari Seitsonen (City of Riihimäki) and Gunilla Isgren (Municipality of Botkyrka) for their commitment to the project and valuable comments along the way.

2.4 Relations to other activities in the project

This reports draws on the results from the previous work within the SubUrbanLab project and from the already published reports.

Previous reports include the following project reports:

- *Boundary conditions for successful Urban Living Labs* (Friedrich et al., 2013)
- *Assessment of the suitability of different Urban Living Labs methods for modernisation and social upgrading actions* (Federley et al., 2016).
- *Selection of Urban Living Labs in Alby and Peltosaari* (Karlsson et al., 2015)
- *Establishment and implementation of Urban Living Labs in Alby and Peltosaari* (Karlsson et al., 2016)

The report *Assessment of the suitability of different Urban Living Labs methods for modernisation and social upgrading actions* (Federley et al., 2016) also focuses on evaluation but centres around presenting and assessing the different ULL methods used within SubUrbanLab. In the report, the aims and set-up as well as outcome of the methods are presented and suitability of the methods for the modernisation and social upgrading actions in the project is discussed. Hence, in this report there is no in-depth evaluation of participatory methods used but it focuses instead on evaluating impacts on sustainability and relation to the Urban Living Lab approach.

All reports are available on the project website www.suburbanlab.eu

3 EVALUATION PROCESS AND METHODOLOGY

3.1 The evaluation process

This report summarises the evaluations of the six real-life modernization and social upgrading **Urban Living Labs** (ULL) undertaken, three in Alby and three in Peltosaari.

The evaluations of each ULL focus around the following two parts:

1. Evaluation of the ULL's contribution to sustainability (environmental, social and economic)
2. Evaluation of fulfilment of the ULL definition

A number of different evaluation methods, qualitative and quantitative, have been used to evaluate the two parts. The evaluation plan and methods for each Urban Living Lab is specific to that particular Urban Living Lab, as the Urban Living Labs are focused on different actions, using different methods and set in different contexts with different users. IVL in Sweden and VTT in Finland has been the main responsible for the evaluation and setting up plans for evaluation, including which methods to be used. A more detailed description of the evaluation methods used can be found in the chapter of each ULL.

Below, each of the two parts of the evaluation is described more in detail.

3.1.1 Evaluation of the Urban Living Labs' contribution to sustainability

The evaluation of ULLs contribution to sustainability mainly takes its point of departure from sustainability objectives set up for each ULL and sustainability as seen from the context of the particular suburb, but will also discuss contribution to sustainability from a broader point of view. Focus is on all dimensions of sustainability: environmental, social and economic.

The evaluation of the contribution to sustainability at large departs from the definition of sustainable development and its three pillars – environmental, social and economic –as put forward in the Brundtland report '*Our common future*' (1987). In the report, sustainable development is defined as '*development which meets the needs of current generations without compromising the ability of future generations to meet their own need'*. The concept underlines the need for economic and social development, in particular for people with a low standard of living. However, at the same time, it emphasizes the importance of protecting the environment and the natural resource base. The concept puts forward that economic and social well-being cannot be improved with actions that destroy the environment or other future conditions.

The general definition of sustainability is hence broad. However, where the focus on sustainability is depends on the local context where it is applied. Hence, the evaluation of the ULLs in Alby and Peltosaari has departed from a view of what sustainable development is in the particular suburb where the ULL has been implemented. The locally defined sustainability can either be formally tabled as sustainability objectives (as in the case of Alby) or be derived from local policies for sustainable development (as in the case of Peltosaari). The definition of local sustainability in Alby and in Peltosaari is further discussed in chapter 4 (Evaluation of Urban Living Labs in Alby) and chapter 5 (Evaluation of Urban Living Labs in Peltosaari).

The evaluation of contribution to sustainability also departs from specific ULL (sustainability) objectives that have been formulated for each ULL. The ULL objectives were formulated in a dialogue between project partners but also inviting, as far as it was possible, different stakeholders in the discussion. It has been important that both the involved project

partners and the stakeholders have common expectations and objectives for the ULL from the beginning (as defined in the boundary conditions for an ULL), based on the individual objectives of different stakeholders and partners. The objectives concern both the modernization action and the participation of residents and stakeholders within the ULL.

Some aspects of sustainability were not covered by local views/objectives on sustainability or by the specific ULL objectives, but have also been evaluated. As an example, for each ULL, as far as this have been possible, the economic viability (economic sustainability) has been evaluated. Economic viability here refers to how cost-efficient the ULL has been, e.g. compared to more traditional ways of implementing the same actions. Where possible, the project has used cost-effectiveness analysis (CEA) in order to evaluate the cost-effectiveness of the different implemented ULL actions and to compare the different alternatives.

When evaluating the ULLs contribution to sustainability, both quantitative and qualitative evaluation methods have been used, depending on the ULL. For example, the evaluation can be based on a focus group or reference group that, after the project has been finished, discuss how the ULL has contributed to local sustainability objectives. For social sustainability, a before-and-after-survey can reveal changes over time concerning e.g. interest to contribute to the local society and commitment to sustainability. If the sustainability objectives are more technical, to e.g. increase the energy efficiency, quantitative methods have been used.

3.1.2 Evaluation of fulfilment of the Urban Living Lab definition

One important overall aim with SubUrbanLab project has been to test and evaluate the ULL approach. Hence, each ULL has been evaluated with respect to how it has lived up to the project's definition of an ULL.

In this project we have defined an ULL as a forum for innovation and dialogue, applied to the development of new products, systems, services, and processes in order to solve challenges in the urban area. An Urban Living Lab employs working methods to integrate people into the entire development process as users and co-creators to explore, examine, experiment, test and evaluate new ideas, scenarios, processes, systems, concepts and creative solutions in complex and everyday contexts (see JPI Urban Europe 2015). The research and development are intertwined in a 'living laboratory' – in the middle of people's everyday living environment.

An ULL includes the following features (JPI 2013, Ståhlbröst & Holst 2013):

- it integrates researchers, public organizations, residents and companies to co-develop new solutions;
- the users of the developed services or solutions are active partners in the development work during the whole process;
- the solutions will be developed and evaluated in the real use context;
- besides producing the concrete solutions, the aim is to learn and exchange knowledge among the partners;
- the activities are encouraging and rewarding for all participants;

In practice, Urban Living Labs can make use of different co-design methods both face-to-face and online to involve all relevant stakeholders in the process of planning, designing, developing and evaluating new solutions (also see Federley et al., 2016).

The evaluation of the ULL approach here will focus especially on how residents and other stakeholders have been integrated to solve challenges in the urban areas or, in other words, how the knowledge, experience and input from the involved residents and stakeholders have been used in the whole process of the ULL - when developing the ULL, when planning the

ULL and when implementing the ULL. Other aspects of the ULL approach, such as the learning between partners and how invited participants have experienced their participation, will also be discussed.

To be able to evaluate this, documentation, such as meeting minutes, of the ULL processes has been vital throughout the participation and involvement during whole process of all ULL. Interviews with and questionnaires among participating residents and stakeholders have also been important methods to be able to evaluate their involvement.

4 EVALUATION OF URBAN LIVING LABS IN ALBY

4.1 About Alby

Alby is located in the south part of Stockholm and is one of five municipal districts within the municipality of Botkyrka.

The municipality of Botkyrka has approximately 90,000 inhabitants and more than 13,000 of these inhabitants live in Alby. The population in Alby grows with about 2 % per year (Botkyrka kommun, 2015a). Many of the residents in Botkyrka have foreign backgrounds and over 100 different languages are spoken in the municipality (Botkyrka kommun, 2015a). In Alby, about 60% of the residents are either born in another country or have parents that are born abroad (Botkyrka kommun, 2015b). Alby is characterized by many of the social challenges that are typical for urban areas with limited financial resources, such as high unemployment rates. The unemployment rate in Alby is about 7.9%, which is higher than the municipality average of 5.1%. Moreover, the level of education as well as earned income per capita is lower than the municipality average (Botkyrka kommun, 2015c).

The residential buildings in Alby mainly consist of larger blocks of apartment buildings, most of which were built during the so called 'Miljonprogrammet' during years 1965 – 1975 (Botkyrka kommun, 2015a). Many of the areas built during 'Miljonprogrammet', Alby included, are now in great need of modernization of both building stock and outdoor environment while at the same time having limited access to financial resources. The rental apartments in Alby, a total of about 2,500 apartments, have traditionally been owned and managed by the municipal housing company Botkyrkabyggen (Botkyrka kommun, 2015b). However, in 2013 about 1,300 apartments in one area in Alby, Albyberget (Alby Hill), were sold to the private housing company Mitt Alby. The reason for the sale was in large part based on the need from Botkyrkabyggen to secure the financing for renovating their remaining building stock in the municipality (Botkyrkabyggen, 2013). The sale was accompanied by large protests from the residents and other stakeholders in the area (Sveriges Radio, 2013-06-26). In addition to the around 2,500 rental apartments in Alby there are about 1,000 residential houses further away from the district centre, which consist of cooperative flats and terraced houses (Botkyrka kommun, 2015b).

4.1.1 Sustainability in an Alby context

Botkyrka municipality is actively working on sustainable development in their five districts and they have an overall vision to make Botkyrka one of the best areas in Sweden to live, operate and work in. In 2004, Botkyrka municipality signed the European declaration for Sustainable Urban Development, Aalborg Declaration, with the vision of achieving a sustainable municipality. Based on this declaration, Botkyrka has set six sustainability objectives for the entire municipality that represent the municipality's view of sustainable development in relation to its conditions (Botkyrka kommun, 2007). Botkyrka recognizes through its sustainability objectives that sustainable development is about all three dimensions of sustainability - social, economic and environmental - but points out that the emphasis of working with sustainable development in Botkyrka is on the social dimension (Botkyrka kommun, 2009).

Thus, the focus of sustainability efforts in Alby lies, similarly to many other areas with limited economic resources, on social sustainability, such as to reduce unemployment, improve living conditions for children, modernize area identity and increase citizen participation. However, at the same time it is emphasized that all changes must be made with

regard to a sustainable environment. Concerning environmental challenges, the main focus in the long-term program is on renewing the urban environment consisting of the building stock and outdoor environment to become a more diverse, mixed and imaginative urban area that is resource-efficient with minimal environmental impact. However, when renewing the urban environment, the long-term program for sustainable development in Alby underlines that it is important to take into account the social challenges (Botkyrka kommun, 2009).

> *'We envisage Alby as a place to settle down and grow in, a creative, international urban district of Botkyrka and the Stockholm region'.* (Botkyrka kommun, 2009)

The long-term plan for Alby was adopted in 2009 after a comprehensive dialogue inviting residents and other stakeholders to actively, via focus groups and workshops, take part in the development of local sustainability objectives for Alby. These objectives are presented in the document 'The Future of Alby' which is used as a policy document for the municipality's activities in Alby (Botkyrka kommun, 2009).

The five main objectives of sustainable development in Alby are:

- Ensuring a decent setting for girls and boys to grow up in;
- Improving the employment opportunities of women and men;
- Renewing the urban environment;
- Modernizing Alby's identity;
- Trying out new working methods at the municipality.

4.2 Evaluation of Urban Living Lab 1 in Alby

4.2.1 Summary of the Urban Living Lab

Alby Urban Living Lab (ULL) 1 'Shape Your World', which was implemented from November 2013 to October 2014, provided youth (and youth leaders) with the opportunity to increase their knowledge and understanding of sustainable development and urban gardening while participating in renewing their urban environment. The ULL took place at Alby Youth Club where the children and youth together renewed and uplifted the youth club using urban gardening in the youth club courtyard and indoors through a hydroponic window-farm.

The ULL 'Shape you world' was implemented by the SubUrbanLab project partners in Sweden, IVL and Botkyrka, in cooperation with Boodla[1], a social entrepreneur that together with children and young adults creates gardens in urban environments.

The objectives for the ULL were developed in discussion between IVL, Botkyrka municipality and Boodla in the development and planning of the ULL. The four objectives for the ULL 'Shape Your World' were:

- to provide children and youth the opportunity to increase their interest, knowledge and skills about gardening, the environment and sustainable development;
- to provide children and youth an increased interest, knowledge and skills about how to engage, participate and have an impact on local society;
- to offer children and youth meaningful leisure activities related to sustainable development;
- to renew the urban environment through gardening, thereby increasing the suburb's attractiveness and improve the environment.

The sustainability objectives in Alby relevant for the ULL 'Shape Your World' are:

- Ensuring a decent setting for girls and boys to grow up in
- Renewing the urban Environment

For more detailed information on the selection and implementation of ULL 'Shape Your World', see reports *Selection of Urban Living Labs in Alby and Peltosaari* (Karlsson et al., 2015) and *Establishment and implementation of Urban Living Labs in Alby and Peltosaari* (Karlsson et al., 2016] (available at www.suburbanlab.eu).

4.2.2 Evaluation methods

As ULL 'Shape Your World' has focused on the knowledge, interests and skills of children and youth concerning urban gardening, sustainability development and local participation, the evaluation methods have mainly been qualitative. In order to evaluate the ULL's contribution to sustainability (ULL objectives, Alby sustainability objectives and economic sustainability) interviews have been the main method of evaluation.

Interviews

A number of semi-structured interviews have been carried out after the ULL implementation, for example with 10 participating children and youth (2014-10-18), one municipality representative (2014-12-18) and two representatives from Boodla, the main facilitator of the ULL, (2014-11-24). For the interviews, flexible interview guides with open ended questions were prepared as basis for the interviews with questions aimed to cover different aspects of sustainability related both to ULL objectives and Alby sustainability objectives. Detailed

[1] www.boodla.se

notes were taken during the interview by the interviewer but the interviews were not transcribed to the exact wordings. The notes from each interview were then summarized in a document, which is the basis for the evaluation.

Documentation

The main method for evaluating the fulfilment of project ULL definition has been continuous documentation of all phases of the ULL, such as meeting minutes and e-mails, as well as interviews with key stakeholders. The whole process of developing, planning and implementing the ULL is described in the reports *Selection of Urban Living Labs in Alby and Peltosaari* (Karlsson et al., 2015) and *Establishment and implementation of Urban Living Labs in Alby and Peltosaari* (Karlsson et al., 2016) which is the main basis for the evaluation of fulfilment of ULL definition.

4.2.3 Evaluation of the Urban Living Lab's contribution to sustainability

The evaluation of the ULL's contribution to sustainability is divided according to the three dimensions of sustainability: environmental, social and economic sustainability.

Most objectives set up for ULL 'Shape Your World' and the relevant Alby sustainability objective (see 4.2.1.) focus on social sustainability, such as increasing the knowledge and skills of participating youth and ensuring a decent setting for girls and boys to grow up in. Hence, the focus for this evaluation of contribution to sustainability is also on the social dimension. However, contributions to environmental sustainability, such as to renew the urban environment through gardening, thereby increasing the suburb's attractiveness and improve the environment, as well as economic sustainability are also addressed.

Social sustainability

Interest, knowledge and skills about gardening, the environment and sustainable development as well as local society

One objective of the ULL was to provide children and youth the opportunity to increase their interest, knowledge and skills about gardening, the environment and sustainable development. The evaluation shows that most of the interviewed participating youth state that they have gained increased knowledge about urban gardening after the ULL and that they have an increased interest to participate in similar urban gardening activities in the future. These findings are also supported by the representatives from Boodla based on observations made during the workshops. Interesting to note is also that all interviewed youth state that they already have some experience of gardening from home, i.e. the urban gardening seems to attract children and youth who are already familiar with gardening from home. Additionally, it can be argued that the interest and knowledge of urban gardening from the youth leaders, responsible for the activities in the youth club, was increased during the ULL. The youth leaders were not initially thought of as an important target group for the ULL, but it quickly became evident during the implementation of the ULL, that the participation of youth leaders (role models) was essential to engage the children and youth at the youth club. An increased interest in urban gardening among this group is therefore important in the contribution to social sustainability.

For the children and youth, to make the connection between the ULL activities of urban gardening and the environment and sustainable development at large, was however more difficult. All interviewed youth had difficulties to see how their participation in urban gardening was linked to the environment and sustainable development. When asked if they feel like they have gained increased knowledge of or interest for the environment and sustainable development during the ULL, the interviewed youth referred to, for example, what they had learnt about environment in school or the importance of waste recycling. They did

not make any references to the urban gardening. Likewise, it was not possible for the interviewed children and youth to see the connection between the ULL activities and participation in or impact on local society. This difficulty for the children and youth, to make the connection between urban gardening in the youth club and environment and sustainable development as well as local participation, was also highlighted by the facilitators from Boodla and observed during the ULL process. It was underlined by Boodla that more focus on discussion about the potential role of urban gardening and also more time is needed for the children and youth to see and understand these connections and also gain increased knowledge and interest of the environment/sustainable development and local participation.. Impact on knowledge of and interest for environment and sustainable development as well as local participation is more of a long-term effect.

To place the urban gardening activities in different outdoor locations in need of uplifting in the suburb, chosen by the youth themselves, could be one way to clarify and increase the link between urban gardening, environment and sustainable development and local participation. This was the initial idea of the ULL 'Shape Your World', but it was changed into urban gardening at the Youth Club as it was more difficult than expected to engage youth in a new activity outside their 'comfort zone'.

To conclude, it can be argued that the ULL has contributed to increase the knowledge of and interest for urban gardening of both children and youth as well as of youth leaders, which can be seen as a contribution to social sustainability. The ULL 'Shape Your World' cannot, however, be argued to have contributed to sustainable development by increasing the knowledge of and interest for environment and sustainable development or local participation among the participating children and youth.

Meaningful after-school activity

A third objective for the ULL 'Shape Your World' was to offer children and young adults meaningful leisure activities related to sustainable development. Urban gardening had previously not been offered as an after-school activity for youth in Alby and was hence a new activity for youth in the area. It can be argued that urban gardening, as a new after-school activity for children and youth in Alby and something very different from other activities offered at the youth club, has provided children and youth with a new meaningful leisure activity by broadening the selection of activities in the youth club. Other activities already offered at the Youth Club included table tennis, billiards and video games. Between one and 15 children and youth (in total 78, not taking into consideration the overlap) have participated in each workshop i.e. participated in this new activity offered. However, it should be noted that this new after-school activity at the Youth Club did not continue after the ULL 'Shape Your World' was finalized, as the continued work by Boodla had somewhat different focus in target group (see 4.2.5 for continuation). That is, the long-term sustainability could here be questioned.

Contribution to Alby Sustainability Objectives

The ULL can also be argued, through its activities and process, to have contributed to increasing the social sustainability in Alby by addressing the Alby sustainability objective 'Ensuring a decent setting for girls and boys to grow up in'. As part of the objective, it is underlined that "*opportunities for children and young people to cultivate their creativity*" is needed (Botkyrka kommun, 2009). It is also highlighted, that it is important to expand Alby's offering of indoor and outdoor activities to "*generate additional opportunities for stimulating interpersonal encounters*" and to *"provide more occasions for people to get together and build common values"* in order to create a *"safe, secure setting to grow up in"* (Botkyrka kommun, 2009). ULL 'Shape Your World' can be argued to have increased the opportunities

for children and youth to cultivate their creativity and increased the interaction between children and youth using urban gardening, hence, contributing to creating a more safe setting.

Other related studies

The potential contribution of urban gardening (with youth) on social sustainability can also be found when looking at results reported by other urban gardening projects, both in suburbs and in other urban areas. One example is an urban gardening project in Seved, a district of Malmö (Sweden) with similar challenges as Alby. The urban gardening in Seved was part of the project 'Barn i Stan' (Kids in Town) with the objective to create a meeting place for children and parents with immigrant background and Swedish seniors. As a result of the project, it was reported that the children gained more knowledge about gardening but also that it gave them a sense of pride to have been involved in and contributed to the improvements of the area (Delshammar 2011). The urban gardening in Seved was also argued to have provided a greater sense of security in the area and made the area a more attractive place to live in (Karlsson 2011, Hållbar Stad 2013). Similar findings have been reported by the project 'Plantering utan gränser' (Planting without borders) in the city of Helsingborg (Sweden), an urban gardening project with the aim to increase the social sustainability in different parts of city. An evaluation of the project establishes that the urban gardening has led to an increase of social security by offering meeting places where neighbours can get together and networks between various associations and residents are developed. The evaluation also shows an increased involvement and interest among the residents in their own neighbourhood and that the urban gardening sites also serve as safe meeting places, especially for women, girls and elderly (Delshammar et al. 2014).

An example outside of Sweden, where urban farming has increased the social sustainability amongst young people, is the 'ENY Farms!' (East New York Farms!). One of the main goals with the project, except from growing fresh produce in the neighborhood, was to "*offer youth interns a chance to learn about horticulture and agriculture and developing business and job skills*" (Hung 2004). Interviews with the youth interns showed, similar to the project in Seved, that the participants of 'ENY Farms!' gained feelings of usefulness and developed a sense of responsibility, partly because of the actual internship that was offered, but the growing and taking care of plants also made the participants feel responsible (Hung 2004). The 'ENY Farms!' project also increased the ability and opportunity of the youth to understand and work with people from different cultures. The garden was also reported to give the youth a safe, peaceful place to hang around, which both helped them to calm down and also helped them to "*stay off the streets*" (Hung 2004).

Environmental sustainability

Renewing the urban environment

One objective relevant to environmental sustainability was set up for the ULL: to renew the urban environment through urban gardening, thereby increasing the suburb's attractiveness and improving the environment. Based on the interviews with participating youth, it can be argued that the urban gardening, by renewing the urban environment inside and outside (court yard) the youth club, has increased the attractiveness of the youth club. All the interviewed youth put forward that the youth club looked better with the hydroponic window-farm and that the courtyard has become nicer after the urban gardening took place. Although it cannot be said that suburb's attractiveness has increased, the attractiveness of the youth club can be argued to have increased. The impact of the urban gardening at the youth club on the environment as a whole (e.g. climate, biodiversity, indoor environment etc.) has not been further evaluated due to the small-scale of the urban garden, as it is assumed to be minor. However, the impact on the environment from urban gardening could increase if/when

activities such as ULL 'Shape Your World' were up-scaled in the suburb (more on continuation of the ULL in 4.2.5).

Contribution to Alby Sustainability Objectives

In the long run, by laying the foundation for more urban gardening activities with children and youth in Alby, it can be argued that the ULL 'Shape Your World' has contributed to the Alby sustainability objective 'Renewing the Urban Environment'. As part of the objective, it is highlighted that "*all changes to the urban development must be climate-smart*" and that it is important to "*create a resource-efficient urban district that has minimal environmental impact, further contributing to sustainable development*" (Botkyrka kommun, 2009). Urban gardening, especially if up-scaled in the future together with residents and other stakeholders, is a climate-smart urban development which contributes to creating a resource-efficient urban district that has a minimal environmental impact.

Other related studies

Looking at evaluations from other projects as well as studies concerning the impact of urban gardening, it is put forward that urban gardening does not only lead to an increase in social sustainability, but also in environmental sustainability. For example, previous studies underline that urban gardening has the potential to help to restore and remediate areas in need of an up-lift (Brown et al., 2002) and can contribute with environmental functions such as biodiversity conservation, waste water management and shaping the urban micro-climate by providing shade and reducing wind (Lovell, 2010).

A paper by Okvat and Zautra (2011) discusses different direct and indirect ways how urban gardening or farming can increase environmental sustainability. As a direct contribution, an urban garden can help to reduce GHG emissions by functioning as a carbon sequestration. This function, however, depends to a big extent on the size of the garden and might not be applicable on every urban garden. Urban gardens can also help to lower the experienced surrounding temperature by reducing the effects of urban heating and thus decrease the need for cooling during warm seasons. If the urban garden is utilized for food production, the environmental effect can also lead to a decrease in CO_2-emissions by reducing the need for food transportation, packaging and storage. This is also described in a report on the community garden in Baltimore, Maryland (Poulsen et al. 2014), where the environmental benefits of an urban garden are described as an improvement of the urban landscape, for example by providing green space in urban environments and making healthy food more accessible (Poulsen et al., 2014). The more indirect environmental effects urban gardening can have on the environment are, among other things, increased knowledge and understanding among residents about climate change and the environment as a whole as well as a potential of teaching residents about the eco-system services an urban garden holds. In the long run, more knowledge could lead to an increase in environmental sustainability in general (Okvat & Zautra, 2011). These indirect environmental effects are underpinned by a report by Middle et al. (2014) which states that gardening is one of the most effective ways of teaching about ecology in urban areas.

Economic sustainability

Economic sustainability is difficult to estimate in the ULL "Shape Your World" as most of the benefits cannot be reliably quantified monetarily. Rather, the ULL contributes to economic sustainability indirectly. For example, the participation of youth in the urban gardening at the Youth Club, increasing its attractiveness, could decrease costs for damages. Studies have shown that residents influence in district renewal (here, youth influence on Youth Club improvements) creates involvement and commitment which ultimately leads to less damage (see e. g. Boverket, 2009). Overall it is up to the local decision makers to assess whether the overall benefits justify the costs.

4.2.4 Evaluation of fulfilment of the Urban Living Lab definition

The evaluation if ULL 'Shape Your World' has lived up to the definition of an ULL takes its point of departure from the definition and features presented in 3.1.2. The evaluation will first focus on if/how residents and other stakeholders have been integrated as active partners during the whole process - in developing, planning, implementing and evaluating the ULL - to solve environmental and social challenges in the area. Other aspects of the ULL approach, such as the if/how the ULL has been developed in the real use context and how invited participants have experienced their participation, will also be discussed.

A first statement to be made is that a variety of stakeholders and organisations have been integrated in the ULL 'Shape Your World' to co-develop the urban gardening, which is one of the features of an ULL. This includes researchers (IVL), public organizations (municipality of Botkyrka), companies (social entrepreneur Boodla), non-governmental organisations (youth organisations and other organisations in Alby) as well as users (mainly children and youth but also youth leaders).

As previously mentioned, IVL and Boodla together with the municipality of Botkyrka were the main drivers behind the ULL 'Shape Your World' as ULL project partners and, hence, drivers behind the process of developing, planning and implementing the ULL. But the users and other stakeholders (as stated above) were also involved and gave their input in the different stages of the process. However, much of the final decision-making was made by the ULL project partners, based on the input from users and stakeholders.

In the development process of the ULL (i.e. when selecting the ULL) involved organizations were the ULL project partners IVL, Botkyrka and Boodla. At this point, a first focus of the ULL was discussed, as well as an initial idea of how the process and implementation could look. Later, in the planning process of the ULL, municipality representatives from different administrations and important stakeholders such as representatives from youth clubs (other than youth leaders), schools, youth culture clubs and youth sport clubs were contacted in order to get input on the implementation of the ULL. Common for all involved stakeholders in the planning process of the ULL was that they had knowledge and experience of engaging children and youth in different activities (other than urban gardening) and could give advice based on their expertise. Plenty of valuable input and suggestions were gathered during the different meetings/interviews with these stakeholders and taken into account in the process of further evolving the ULL according to the real use context. One concrete "turn" the ULL took based on the input from these stakeholders, together with the initial difficulty to engage youth in the urban gardening, was the decision to place the activities of the children and youth at the youth club, rather than persuading children and youth to participate in (new) activities outside of their "comfort zone". Hence, the initial idea to gather a core group of interested children and youth outside existing youth "locations" and to have them point out sites in Alby, that they thought needed to be renewed with urban gardening, was put on hold as the activity of urban gardening was not mature enough to engage youth in this way. The initial idea to target children and youth between 12-18 years was also modified based on the consulted stakeholder's experience of the difficulty to engage youth between the ages of 15-18 years. The targeted users (children, youth and youth leaders) were not an integrated part of the development and planning of the ULL as this would have been a very time-consuming task, and it was also not doable with the pre-existing level of engagement and interest in urban gardening among the targeted users.

During the implementation process of the ULL, the main involved stakeholders were the users of the urban gardening activity, i.e. the children and youth, but also the youth leaders. The children, youth and youth leaders can be argued to have provided their knowledge, experience and input to the implementation process both directly and indirectly. A direct involvement by the children and youth was, for example, that they participated in deciding what to plant,

choosing seeds and making a plan of the new garden in the youth club courtyard. The children, youth and youth leaders were also directly involved in deciding the themes for the workshops, especially for the final workshop, where the youth and youth leaders requested a pumpkin-carving activity as the Halloween time was approaching. An indirect involvement from the children, youth and youth leaders is how their attitudes and interests influenced the ULL activities and the implementation process. For example, the hydroponic window-farm put up during the implementation of the ULL got a lot of attention from the children and youth, and therefore these activities related to the window-farm were up-scaled. Hence, during the implementation process of the ULL, the urban gardening activities were further developed and changed according to the direct and indirect involvement of children and youth as well as youth leaders.

As is evident from the description of methods used for evaluating, the users (children and youth) as well as other stakeholders (municipality representative) were also involved in the evaluation process of the ULL through interviews, having the possibility to state their opinions and to give feedback on the process and activities.

One comment should be made here concerning the participation of children and youth in the urban gardening activities with ULL 'Shape Your World'. As the ULL implementation, for different reasons explained above, was placed at the youth club, the participants were mainly children and youth already active at the youth club and in different youth activities organized by the youth club. The children and youth using the youth club were primarily loud boys in the ages between 12-14 years, which could be seen as a consequence of the high volume of music played at the youth club and the types of existing activities (table tennis, billiards and video games). Hence, more silent boys and girls were not as often present at the youth club, or just stayed there for a very short time. By taking the decision to place the ULL at the youth club, it was hence difficult to reach these more "passive" or "shy" children and youth not already active at the youth club (or maybe not active in after-school activities at all). In an effort to attract also other groups of youth to the urban gardening activities at the youth club, posters were put up around Alby with information about the activities and also other existing channels of communication were tried, such as the social media. To reach this more passive group, who could be more in need to be encouraged to participate in new types of activities, is however a time-consuming task and especially difficult with a new un-mature activity such as the urban gardening was in Alby at that time. More efforts to reach a broader group of youth have been made in later urban gardening activities targeting youth in Alby (see 4.2.5 on continuation).

Another question is how the participants experienced their participation. In the interviews with children and youth, the participants that had taken part in several workshops were asked, if they found that their knowledge, experience and input had been considered in the process. The answers show that the youth feel that their suggestions for what should to be planted and how, such as their preferred choice of vegetables and locations of plants, had been listened to and taken into consideration in the activities.

Has the ULL then lived up to the ULL definition and allowed a valid involvement of residents and other stakeholders? The ULL 'Shape Your World' can be argued to have lived up to the definition of an ULL to a large extent. The ULL has involved different stakeholders and organizations to co-create the urban gardening within the ULL. Both stakeholders and users (children, youth and youth leaders) have been integrated during the whole process from developing and planning the ULL to the evaluation of the ULL using different methods. The stakeholders (youth organizations, schools etc.) were mostly involved in the planning of the ULL, while the users were mainly involved during the implementation, i.e. the development of the urban gardening of the ULL. The users as well as some stakeholders were also involved in the evaluation of the ULL. The users were hence mainly active partners during the

implementation of the ULL (see features in ULL definition) while other stakeholders *and* users have been active partners in the process from planning to evaluation. However, no users or other stakeholders outside the ULL project group were involved in the initial development of the ULL. Even though the children, youth and youth leaders have not been directly engaged in the initial development and planning of the ULL, the implementation process was still open-ended enough allowing the users to contribute their ideas and wishes in shaping of the implementation process. However, if the engagement of especially children and youth had been possible at an earlier stage, would it have facilitated to better identify areas of interest among the youths related to urban gardening and to find other channels to reach the youths, hence help engaging more and other children and youth?

The involvement of users (children, youth and youth leaders) and other stakeholders as well as the location of the youth club have furthermore allowed the ULL to be developed and adapted to the real use context. It is, however, difficult to know if the activities and participation have been rewarding to the users and encouraged learning between participants. From the interviews with youth, it can only be argued, that most of the interviewed children and youth that took part in several workshops felt to have been listened to and that they have increased their knowledge about urban gardening. No information was collected concerning if the participating children and youth found their participation rewarding. The process has, however, been rewarding to involved organizations in the project group and encouraged learning between the project partners for this ULL.

4.2.5 Continuation

As a direct result of the experiences from ULL 'Shape Your World', the social entrepreneur Boodla has continued to work with urban gardening targeting young adults. In 2015, Boodla received funding for a project called 'Democracy gardening', building on the ULL 'Shape Your World'. 'Democracy gardening' will be implemented during 2015 – 2018 and it targets youth under the age of 23 in Botkyrka municipality with limited experience of local participation. As part of the project, these participating youth will increase their knowledge and skills in urban gardening, environment, sustainability and democratic leadership. Activities such as urban gardening workshops, inspirational lectures, coaching and study circles focusing on project management and leadership are included. Through education on democracy and leadership combined with urban gardening, the project aims to provide youth with means to build self-esteem and motivation to take a positive place in society. The project hence provides the youth with opportunities to figuratively and literally take place in the public space. 'Democracy gardening' aims to start activities in the municipality of Botkyrka and later spread to other municipalities and regions in Sweden. So far, the interest for activities within 'Democracy gardening' among youth has been high[2].

4.2.6 Lessons learned and conclusions

Based on the evaluation it is possible to say that 'Shape Your World' has contributed to increased social sustainability by increasing the users' (children, youth and youth leaders) knowledge of and interest in urban gardening and by providing a new after-school activity. The attractiveness (in terms of venue) of the Youth Club has also increased. Impact has, however, been minor as the ULL has been small-scale and limited in time, also much time was spent on promoting the (new) activity of urban gardening towards children, youth and youth leaders. It also takes time to see the impact and effect of an activity such as urban gardening. Urban gardening together with residents and other stakeholders, however, has

[2] Read more about the project on http://www.studieframjandet.se/Stockholms-lan/Hitta-ditt-intresse/Miljo--samhalle/Demokratiodling/ or https://www.facebook.com/Demokratiodling-1105473902803202/

potential for up-scaling with further and larger impact on sustainability, both in Alby and beyond. The review of other similar projects and studies on urban gardening confirm many of the sustainability impacts from ULL 'Shape Your World', for example the impact on increased interest, but also show a number of other ways how urban gardening, depending on design, can contribute to urban sustainability. The continuation through a new youth urban gardening project by Boodla, which was possible due to the experiences and lessons learned from ULL 'Shape Your World', also shows that there is continued interest for urban gardening activities in Alby and surrounding suburban areas among youth, based on their high interest to participate in the project, as well as the interest of other key stakeholders (including funders).

'Shape Your World' is furthermore a good example of how to work with an ULL approach on a small-scale project. For example, 'Shape Your World' has allowed an involvement of both users (children, youth and youth leaders) and other stakeholders (youth organisation, schools etc.) during most of the ULL process, with the users being active partners during the implementation process. The users and stakeholders were, however, not involved in the initial development process of the ULL. The urban gardening has also been developed and evaluated in the real use context at the youth club with its users, changing over time and being adapted to unexpected events and user input.

The ULL has, however, had its challenges. One challenge was the difficulty to engage children and youth in the ULL due to the novelty of the activity in the area. Urban gardening was also seen as somewhat "unhip" among youth. To implement a completely new youth activity, such as urban gardening in Alby, a lot of advertisement and "missioning" is needed to engage the children and youth. This is even more time-consuming if the ULL driver is a new actor in the neighbourhood as trust needs to be built up both among youth and among youth leaders. One of the main lessons learned from the ULL is that the involvement and interest amongst the youth leaders is a key aspect in engaging youth in urban gardening activities and they are important to be involved in the project as a link (e.g. youth project leader). Moreover, the experiences showed that it is easier to engage children and youth in novel activities at places, where they already spend their time rather than encouraging them to come to another places and leave their "comfort zone". This could be explained by the difficulty to get youth to commit to activities in their spare time that are not already part of their routines. However, the decision to carry out the ULL at the Youth Club made it more difficult to engage more passive children and youth not already using the youth club.

Another challenge was the difficulty to balance between having an open ended and large involvement from users and stakeholders during the whole process (especially during planning) and to create a framework with a clear end-result that attracted children and youth to participate (to create engagement). This balancing need to be further explored both in working with urban gardening but especially in working with youth.

4.3 Evaluation of Urban Living Lab 2 in Alby

4.3.1 Summary of the Urban Living Lab

The second ULL in Alby, 'New Light on Alby Hill', was implemented during the autumn and winter of 2014/2015. The ULL focused on how using new LED technology and light installations could turn a pathway for pedestrians in Alby Hill, currently perceived as unsafe, into a more attractive and frequently used area. The chosen pathway had been identified by residents in previous surveys and safety tours as a prioritized area. The lighting – consisting of ambient light and projection of four images (light installations) on the pavement and stone walls along the pathway– was planned, designed and implemented together with local residents and other stakeholders. The newly formed Residents Council (Borådet) in Alby Hill was involved in the planning of the ULL as a whole and the design of ambient light, while all interested residents and stakeholders contributed with images for the light installations under the theme "Our Alby". The two winning images were chosen by the residents through an open voting on the ULL website www.nyttljus.eu and with QR-code posters. Four additional images were selected by a jury with representatives from the ULL project partner organizations.

The ULL 'New Light on Alby Hill' was implemented as collaboration between the Botkyrka municipality, Mitt Alby (housing company), the College of Arts and IVL.

The objectives for the ULL were developed in discussions between IVL, Botkyrka municipality, Mitt Alby and the College of Arts in the development and planning phases of the ULL. The four objectives for the ULL 'New Light on Alby Hill ' were:

- Improving people's sense of security in the area;
- Creating a more attractive and energy-efficient street lighting using LED technology and ambient light;
- Increasing the engagement and participation among Alby Hill's residents and other stakeholders in order to facilitate future dialogue processes

The sustainability objectives in Alby relevant for the ULL 'New Light on Alby Hill ' are:

- Renewing the urban environment
- Modernising Alby's identity
- Trying out new working methods at the municipality

For more detailed information on the selection and implementation of ULL 'New Light on Alby Hill ', see reports *Selection of Urban Living Labs in Alby and Peltosaari* (Karlsson et al., 2015) and *Establishment and implementation of Urban Living Labs in Alby and Peltosaari* (Karlsson et al., 2016)((available at www.suburbanlab.eu).

4.3.2 Evaluation methods

The ULL 'New light on Alby Hill' has focused both on increasing the social sustainability (sense of security, area attractiveness and increased participation) as well as the environmental sustainability (energy efficiency), and therefore the evaluation methods have been both qualitative and quantitative. In order to evaluate the ULL's contribution to sustainability (ULL objectives, Alby sustainability objectives and economic sustainability), a number of different methods have been used, described in the following section.

Questionnaire surveys

To evaluate the objectives regarding the increased sense of security, the attractiveness of the area and participation, questionnaire surveys targeting the users of the pathway were carried out before (ex-ante) and after (ex-post) the implementation of the new lighting. The

questionnaire surveys were done orally during a total of six afternoons/evenings. The ex-ante questionnaire surveys were carried out during one afternoon and one evening along the pathway of Alby Hill before the new lighting was installed. After the new lighting was installed, four ex-post questionnaire surveys were conducted to measure possible changes in the way the users of the pathway experienced the new lighting. Two ex-post questionnaire surveys (one evening and one afternoon) were carried out two weeks after the new lighting was installed and the remaining two questionnaire surveys (one afternoon and one evening) were conducted six months after the implementation. By collecting data on different times during the evening and afternoon, different target groups' opinions and views could be captured including people with different schedules and routines. In order to include people who for various reasons do not use the pathway when it is dark outside, the questionnaire survey was also carried out during daylight.

At both ex-ante and ex-post questionnaire surveys the respondents were asked to answer a number of questions about their experience of the pathway and also about their experienced possibility to influence changes in their outdoor environment. Examples of questions asked were: "*Do you feel safe to use the pathway when it is dark outside*?" and "*Do you feel that you are able to influence changes in the outdoor environment where you live*?". The questionnaire surveys also contained information of the users' age and gender as the experiences could differ between gender and between different age groups. The responses from the users of the pathway were then analysed using Excel.

In total, 170 users of the pathway responded to the questionnaire, where 75 responded to the ex-ante questionnaire (before) and 93 responded to the ex-post questionnaire (after). The number of respondents regarding gender and age can be found in Table 1.

Table 1 Description of the respondents of the questionnaire survey

	Number of responses	Which of women	Which of men	Which of younger than 20 years	Which of older than 20 years
Ex-ante survey	75	37	38	23	51
Ex-post survey	93	47	46	36	58

The respondents were furthermore well familiar with the pathway and the surrounding area. Most of them lived on Alby Hill (92%). A vast majority also used the pathway on Alby Hill every day or almost every day (90%). Others used the pathway every or nearly every week (8%) and a few used the pathway a few times a month (2%).

Energy use calculation

To measure the energy efficiency of the new LED-lighting installed, a quantitative evaluation of the measured results was conducted. Before the new lighting was installed the annual energy consumption of the existing lighting was calculated by multiplying the lighting power (watts per hour) with the estimated usage time of the lighting, 4000 hours. The energy consumption of the new lighting in kWh per year was calculated in the same way after the new technology was installed. In energy saving was calculated as a difference of these two consumptions. Based on the calculation of the energy saving, a calculation was also made regarding reduced greenhouse gas (GHG)-emissions[3].

[3] It should be noted that this calculation of GHG-emission does not take into consideration the whole lifecycle of the new products, for example production and waste, but only looks at the energy saving.

Cost Effectiveness Analysis

Based on the evaluation of the energy consumption, a Cost Effectiveness Analysis (CEA) was conducted to examine the economic sustainability of 'New light on Alby Hill'. A CEA is favourably used when the outcome of an action is difficult to evaluate in monetary terms. The most common way to analyse the value of a measure is to perform a Cost-Benefit Analysis (CBA). This approach, however, has some shortcomings as it requires that all outcomes of an action can be measured monetarily (Tuominen et al. 2015). Within sustainability projects such as 'New light on Alby Hill', this is not possible when the benefits such as reduced emissions and increased security are difficult to quantify monetarily, thus a CEA is preferred. By using CEA it is possible to make an economic assessment of the new lighting solution in a more time- and cost-efficient way. The result of a CEA provides a clear figure of the cost of the energy saved and focus on the cost of achieving the desired goal. When the results are presented as the cost of a device/solution (in this case per every saved kWh), it's easier to make comparisons with other projects and activities. The evaluation of cost-effectiveness is done to measure the performance and effectiveness of the ULL. From a public policy point of view, the main argument for evaluating the costs and benefits of projects is for ascertaining whether public support for the project is a sound investment.

Documentation

The main method for evaluating the fulfilment of the ULL definition was the continuous documentation of all phases of the ULL, such as meeting minutes and e-mails, as well as interviews with key stakeholders. The whole process of developing, planning and implementing the ULL is described in the reports *D 3.1 & 3.2 Selection of Urban Living Labs in Alby and Peltosaari* (Karlsson et al., 2015) and *D 3.3 Establishment and implementation of Urban Living Labs in Alby and Peltosaari* (Karlsson et al., 2016) which is the basis for the evaluation of fulfilment of ULL definition and features.

It should be noted here that one further method planned to be used for the evaluation of ULL "New Light on Alby Hill" was compare the number of pathway users before and after the implementation of the new lighting. In early October, before the ULL implementation had started, a laser counter was installed half way through the pathway in order to count number of pedestrians. However, before the data could be collected, the laser counter had been stolen. No new laser counter was available replace the stolen one, hence, the project had to exclude this evaluation method for the ULL.

4.3.1 Evaluation of the Urban Living Lab's contribution to sustainability

The evaluation of the ULL's contribution to sustainability is divided according to the three dimensions of sustainability: environmental, social and economic sustainability.

The main objectives with the project were to improve people's sense of security, to increase the participation among Alby Hill's residents and in the same time to improve the energy efficiency and attractiveness of the street lighting. In the following sections, an evaluation of ULL's contribution to environmental, social and economic sustainability is described, based on the main objectives related to 'New light on Alby Hill'. Contribution to sustainable development objectives for Alby as a whole are also discussed.

Social sustainability

Sense of security

One of the main objectives of the ULL was to improve people's sense of security when using the pathway by improving the street lighting on the pathway. The evaluation, based on the ex-ante and ex-post questionnaire surveys, showed that less than half (41%) of the respondents in the ex-ante (before) survey perceived the pathway as safe when dark outside, whereas 46%

did not perceive the pathway as safe and 13% perceived the pathway as sometimes safe. Looking at the results from the ex-post (after) survey, the total number of respondents that perceived the pathway as safe has somewhat increased after the new lighting was installed, from 41% to 50%, but no major changes were observed looking at the results from all respondents (see Figure 1).

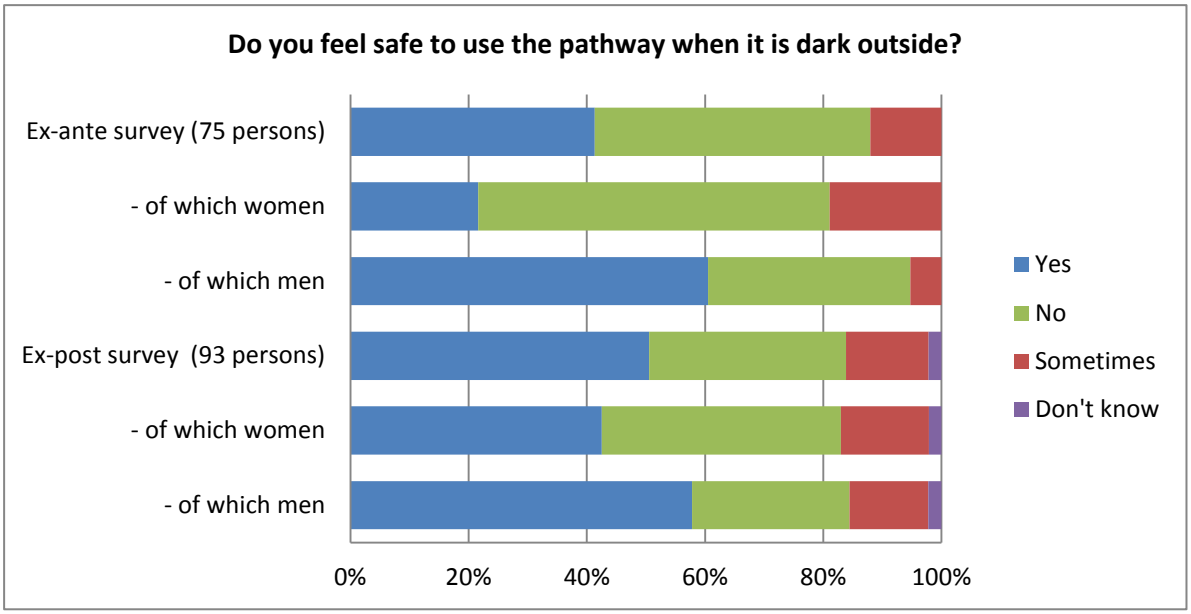


Figure 1 The perceived safety among the users of the pathway before and after the installation of the new lighting, with the division between men and women.

Looking at the results from a gender perspective, it is evident that it was primarily women that had a perceived sense of insecurity when using the pathway during dark hours, both before and after the upgrade of the lighting. In the ex-ante questionnaire survey only 21 % of the women stated that they perceived the pathway as safe during the dark hours, compared with 60% of the male respondents. This means that before the new lightning was installed, 79% of the women that responded to the questionnaire did not perceive the pathway as safe or only safe to use sometimes when dark outside (see Figure 1), which can be considered as a high figure. Several men also expressed, that although they felt safe using the pathway when dark, their wife or daughters did not feel safe (see Textbox 1).

The results from the ex-post survey show that the amount of women that felt unsafe or unsafe sometimes using the pathway during dark hours had reduced after the new lighting was installed, from 79% to 55%. The amount of female respondents who perceived the pathway as safe after dark hence increased from 21% to 42%. No significant difference in the ex-ante and ex-post questionnaire survey can be observed concerning mens' perceived sense of safety, or between age groups.

It should be noted that the results from the questionnaire survey should be viewed with some caution as the increase in the sense of security is neither particularly large nor statistically significant. It should also be mentioned that the respondents were not the same in the ex-ante and ex-post survey which also could have had impact on the result. There can also be other factors influencing the results.

Despite of these insecurities of the questionnaire survey, the results together with commentaries the participants also contributed with (see Textbox 1), indicate that the new lighting on the pathway has increased the sense of safety amongst women. Many of the participants expressed that they thought the pathway was better and lighter with the new lighting system and a larger number of female users expressed a sense of safety using the pathway when dark outside in the ex-post survey. At the same time, the evaluation of the

survey also shows that a high proportion of the women respondents (55%) as well as men (39%) still felt insecure or sometimes insecure despite of the new lighting.

Comments ex-ante survey	Comments ex-post survey
"Unsafe. More lighting is needed" (Man, 20-29 years)	*"Sketchy. Lights are stronger. Better with no bushes. Better than before."* (Woman, 20-29 years)
"Daytime is ok. In the evening when it's dark is a bit worse". (Man, 60-67 years)	*" Looking back, afraid that someone will follow. But it has gotten better.* (Man, 10-19 years)
"Scary, dangerous. Dark. People smoking on the bench" (Woman, 10-19 years)	*"Dark in the evening. It has gotten better."* (Woman, 20-29 years)
"Unsafe. It needs more lighting" (Woman, 20-29 years)	*"Dark in the evening. Have not noticed any change."* (Woman, 40-49 years)
"Dark. Particularly dangerous for children." (Man, 50-59 years)	*"Everywhere dangerous. Many are afraid because there are no houses nearby, only the forest. "* (Woman, 50-59 years)
"I am scared here" (Woman, 60-67 years)	*"Problem. People hang out here and there. My wife thinks it is unsafe"* (Man, 20-29 years)
"Not good. Not enough light. It never feels safe. Scared at night. " (Woman, 40-49 years)	*"Sometimes scary at night, especially for my younger siblings"* (Man, 10-19 years)
"Scary. Especially the gorge." (Woman, 20-29 years)	*"Nice. But dark."* (Woman, 40-49 years)
" Good, but many hills. Scary persons." (Woman, 10-19 years)	*"Too dark, needs more lights."* (Man, 10-19 years)
" A little scary. Unpleasant. Prefer a different route when it is dark out." (Woman, 30-39 years)	*"A bit dangerous to walk. Has become a little better with the new lighting."* (Woman, 10-19 years)
"Scary. Stressful." (Man, 20-29 years)	*"Dark, but the new lighting has made some difference."* (Woman, 10-19 years)
"Dark. Afraid to walk when it's evening" (Woman, 10-19 years)	*" You get used to it. If it is after 22 pm my son will pick me up. The new lighting reminds me that there is danger."* (Woman, 50-59 years)
"Only unsafe when the lights are broken. Which is often" (Woman, 30-39 years)	*"What should one think? Scary forest. Don't usually walk when it's dark."* (Woman, 10-19 years)
Scary when it's dark." (Woman, 10-19 years)	*" You don't feel very safe. The lighting is better but you still feel insecure."* (Woman, 40-49 years)
"It's okay. But more light is needed. " (Woman, 20-29 years)	*"Very dark at night. Needs even more light."* (Woman 30-39 years)
"Dark. Intimidating persons." (Woman, 10-19 years)	*" Few lamps. My wife cannot walk by herself. The lights are good, it's better now."* (Man, 30-39 years)
"Good. Dark sometimes. Mothers and children are unsafe." (Man, 10-19 years)	
"As a man I feel safe. But it feels unsafe for the family, I always go and meet up with my family." (Man, 50-59 years)	

Textbox 1 What is your opinion about the pathway on Alby Hill? A selection of comments related to security when using the pathway on Alby Hill. Translation by authors.

As a conclusion we can state that the ULL 'New Light on Alby Hill' has had some effect on the sense of security, mainly among women, and by that it has contributed to increasing the social sustainability in the area. Another conclusion is that the sense of security among users

of the pathway depends on also other aspects than the street lighting, e.g. which and how many people are using the pathway during dark hours as well as past events that have happened along the pathway, even far back in time including the fact that the pathway is separated from buildings and is situated in an area with dense vegetation. The evaluation indicates that there is still a need to keep improving the pathway, and work with security on several fronts, so that all the users of the pathway could feel safe to use the pathway at all times of the day.

Participation and engagement

A second objective of 'New light on Alby Hill' was to increase the engagement and participation among Alby Hill's residents and other stakeholders in order to facilitate future dialogue processes, and by this, also improve the social sustainability.

The residents on Alby Hill, and from other parts of Alby, could participate in and influence on the process in several different ways. The channels for participation in the ULL included an on-site test of the ambient light with representatives from the Alby Hill Residents Council, input on the ULL planning from representatives of the Residents Council and other stakeholders as well as resident participation in the creation and selection of images to be projected along the pathway. The residents were also the main target group for the later opening ceremony along on the pathway (see also 4.3.2).

In summary, a total of about 130 residents in Alby have actively participated in the ULL, either through the Residents Council, by submitting images for the competition or by voting on their favourite picture. This number included some overlapping as for example, some residents have both contributed pictures and voted. Furthermore, nearly 400 people have actively sought information about the ULL via the specific ULL website. All residents on Alby Hill have also been informed about the ULL and the opportunity to participate in the image competition and voting via info leaflets in their post-boxes and put up in their buildings, and even more people have been reached through posters and information through various communication channels such as the municipality´s website. On the whole, the conclusion is that the residents' involvement and participation has been high in the ULL, and that there has been an interest in participating from the residents (see also 4.3.2).

The ex-ante and ex-post questionnaire survey with pathways users also included questions on the perceived opportunity to influence the outdoor environment in the respondents' area. The questionnaire survey shows that, as a first result, it was difficult for many of the respondents to take stand regarding if they were able to influence changes in their outdoor environment in their area already or not. In total, approximately 40% of the respondents stated that they could not answer the question concerning their perceived possibility to currently influence their outdoor environment. Figure 2 shows the results from the respondents that could take a stand on the issue. The result indicates that a larger number of these respondents felt that they could influence changes in their outdoor environment after the new light was installed, from 31% to 52% (see Figure 2). The numbers of respondents that did not feel like they could have the possibility to influence had decreased from 9% to 7%.

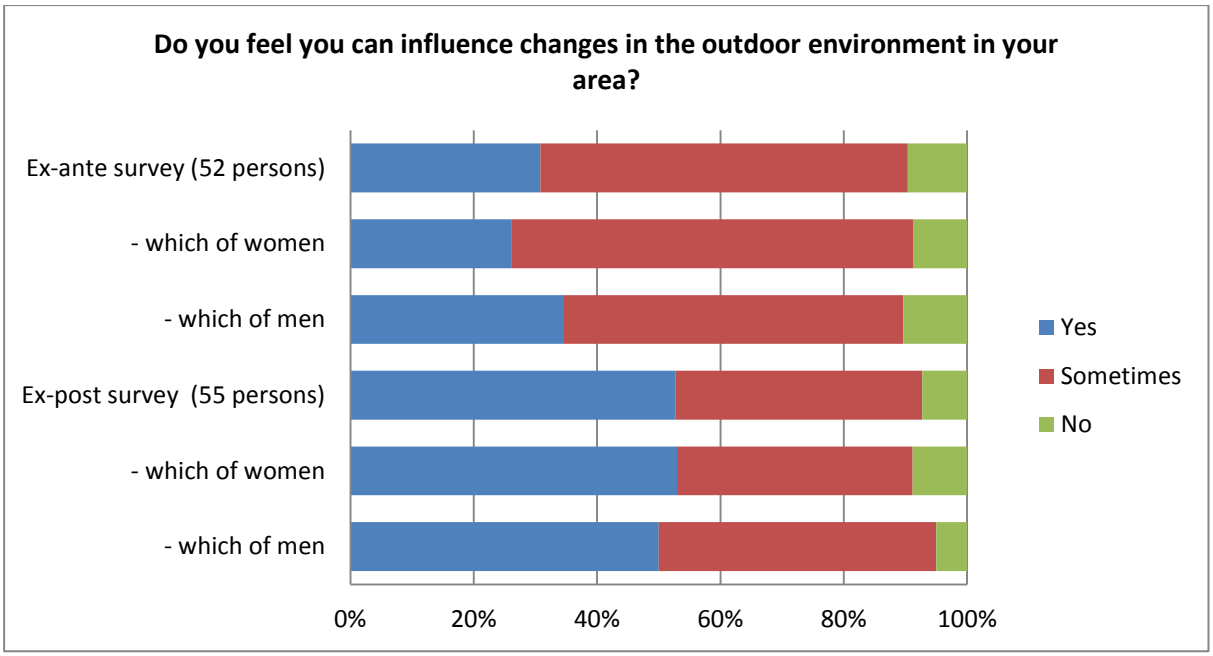


Figure 2 Do you feel you can influence changes in the outdoor environment in your area?

The results from the questionnaires hence show that there are some tendencies leaning towards an increased feeling of the ability to participate after the ULL 'New Light on Alby Hill', but if these results are due to 'New light on Alby Hill' or other factors is impossible to determine. Also, the results should be interpreted with caution due to the low number of respondents and the large number of respondents that could not take a stand on the issue. Furthermore, as mentioned earlier, the selection of the respondents of the survey also comprises different people at different occasions of data collection which may also have affected the outcome. Based on this question in the questionnaire survey, it is also difficult to comment on the feeling of engagement and participation among the hundreds who actually participated within the project, for example by voting, since the respondents consist of the users of the pathway and not those who actively participated in the project.

The question "*do you feel that you have been able to affect the changes along the pathway*?" was asked in one of the questionnaire surveys carried out with users along the pathway after the new light was installed. One third of the respondents (27) stated that they felt that they could affect the new lighting along the pathway, for example by voting. Remaining respondents stated not to have felt that they could affect the changes along the pathway or did not know. In Textbox 2 a number of representative comments by respondents are highlighted. Although the number of respondents was quite low, it can be indicated that many residents may not have been reached by the information about the project and the possibility to participate or they were reached by the information but still did not think they were able to, or did not want to, affect the new lighting. As previous results put forward, many residents also still experienced the pathway as dark and insecure, despite of the new lighting. This might also provide a feeling of not being able to influence, even if respondents may have been informed by or involved in the project in various ways.

Comments on possibility to influence
''I could have voted. Fun thing." (Man, older than 70 years)
"I have voted!" (Woman 20-29 years)
"I couldn't be bothered." (Man 20-29 years)
"I did not know how to." (Man, 10-19 years)
"I don't know, I didn't think about it." (Man, 30-39 years)
"I have not voted." (Woman, 10-19 years)
"I couldn't access the website." (Woman, 60-70 years)
"I am a student and participated in creating an image." (Woman, 10-19 year)

Textbox 2 Comments by respondents on the possibility to influence the changes on the pathway (a selection of representative comments). Translation by authors.

To conclude, the evaluation of the objective to increase engagement and participation among the residents of Alby Hill and other stakeholders in order to facilitate future dialogue processes hence gives a mixed impression. Although the results from the questionnaire survey are inconclusive, it is possible to state that the engagement from the residents in Alby, especially the residents on Alby Hill, and other stakeholders have been relatively high as more than a hundred people actively participated in the project activities and contributed to the new lighting. This is a positive outcome for future dialogue processes. Based on the results of the questionnaire survey it is, however, difficult to draw any general conclusions on how the feeling of the ability and power to influence as well as the willingness to participate in the future has changed among the Alby residents at large due to the ULL. Nonetheless, it can still be argued that projects like this can contribute to a greater sense of engagement among the participants. This could lay a foundation for continued engagement and participation among the residents and other stakeholders for future dialogue processes.

Attractiveness

Another important objective for the ULL was also to create a more attractive street lighting. Based on the evaluation it is possible to argue that the new lighting, and especially the images projected on the pavement and stone walls, have contributed to make the street lighting more attractive. A first evaluation of the attractiveness of the new lighting was made by the representatives from the Residents Council, who gave their feedback during the on-site test-lighting on which new LED products should be used and how the spotlights should be directed to create the most appealing lighting.

Users of the pathway also gave positive feedback regarding the new lighting and the projected images, both as comments in the survey and during the opening ceremony. In connection to the ex-post questionnaire survey, a number of residents commented that the new lighting and especially the projected images were nice and they brought something new to the area (see *Textbox 3*).

Comments on the new lighting
*"I have seen the images, very nice" (*Man, 20-29 years)
"Nice with the images. The image 'No to racism' is great!" (Man, 10-19 years)
"It is brighter and nicer now" (Man, 10-19 years)
"I have noticed the changes. Very nice with the new lighting and with the images. Finally something new!!" (, 50-59 years)
"It is better but more is needed" (Man, 20-29 years)
*"The lights are stronger, good" (*Woman, 20-29 years)
"It is better now, and fun with the images. Well done" (Man, 30-39 years)
"It feels safer now. It was dark before but much lighter now" (Man, 10-19 years)

Textbox 3 What do you think about the changes of the lighting along the pathway? A selection of comments from the users of the pathway. Translation by authors.

It should, however, be noted that a reoccurring comment among the users of the pathway was also that they had not noticed any considerable change.

The project has also contributed with positive publicity in the local media regarding the pathway and the area, which can help to further promote a positive image of the area to improve the attractiveness (see more below).

Contributions to Alby Sustainability Objectives

The ULL 'New light on Alby Hill' can also be argued to have contributed to increasing social sustainability in Alby by addressing the Alby sustainability objective 'Modernising Alby's identity'. For this objective, a lot of the focus is put on the Alby brand and how Alby is perceived both by residents in Alby and people outside Alby. It is highlighted that "*important events and changes must be made known both in and outside Alby, shaping how it is perceived and thereby its identity*" and that exciting events should be consciously used to "*strengthen Alby's identity*" (Botkyrka kommun, 2009). It is possible to argue that the ULL, especially the images projected on the pavement and stone walls, has helped to modernise Alby's identity by attracting positive attention. As a result of the ULL, Alby Hill and the image projections got considerable positive attention and publicity in local newspapers and regional news coverage on Television (see for example MittiBotkyrka 2015-04-10; Sveriges television 2015-03-19). This can be argued to have contributed to promoting a more positive image of the area to improve the attractiveness, and thus helped to promote the brand of Alby.

The ULL can also be argued to have addressed the Alby sustainability objective 'Trying out new working methods at the municipality'. The objective underlines that a successful development of Alby requires new locally adapted working methods, including an "*inter-administration co-planning, participation of citizens and a holistic approach to Alby as an urban district"*. It is highlighted that in order to meet the need of its inhabitants, the municipality must "*explore new knowledge and ways of thinking in collaboration with the citizens of Alby*". By involving the Alby residents in co-creating the new lighting along the pathway on Alby Hill, and at the same time having an active collaboration between the municipality, the private housing company, a research institute and the College of Arts, the ULL can be stated to have addressed this Alby objective. Additionally this way of working was new for the municipality.

Other related studies

Other previous studies have also closer examined the correlation between outdoor lighting and the sense of safety in an urban environment. Even though there could be several reasons for why a pathway feels safe or unsafe, there are studies that highlight the importance of lighting and can be connected to the objective of improving people's sense of security. Fotios et al.'s (2014) review of road lighting and pedestrian's reassurance after dark affirms that lighting does have an impact in the sense of safety and security. The review investigates a number of earlier studies, as well as conducts a new survey. The conclusion is that lighting is associated with reassurance and that higher luminance leads to greater reassurance.

A different study has focused on the perceptions of outdoor lighting, perceived danger and visual accessibility amongst elderly, young women and disabled people (Johansson et al. 2009). These groups were chosen for the study because of their vulnerability during dark hours in urban settings. Insufficient lighting and the perception of danger affect the mobility of the target groups negatively and thus reduce the social sustainability in the area. The study showed that improved lighting does seem to reduce people's fear of crime. However, the study also concludes that there are several factors, such as environmental trust, gender and individual characteristics, which also have significance regarding the perceived safety or danger.

Regarding the objective to create more engagement and participation, there are several studies which show that the residents influence in district renewal creates involvement and commitment which ultimately leads to less damage, providing more satisfied tenants, lower displacement and increased integration in society (Boverket, 2009). When residents gain influence and feel acknowledged, their sense of belonging and identification with their neighbourhood increases. Commitment is also argued to provide a greater sense of community and thus often also a greater sense of security and comfort which also makes the area more attractive to the residents (Boverket, 2010).

Environmental sustainability

Energy efficiency

The main ULL objective related to environmental sustainability was to create a more energy efficient street lighting using LED technology and ambient light. The evaluation of the new lighting along the pathway on Alby Hill show a significant decrease of the energy consumption of the street lighting on the chosen route, from 4950 kWh/year to 2800 kWh/year (see Table 2). This decrease is considerable also taking into account that the new lighting in addition to new fixtures also includes spotlights and gobos (image projection technology).

Table 2 The energy consumption of the entire route before and after installation of the new lighting consumption

	Watts per hour	kWh/year
Before (fixtures)	1240	4960
After (fixtures inc. spotlights and gobos)	700	2800

The decrease in energy consumption in turns implies a decrease in carbon dioxide emissions by 50 kg per year for the municipality, based on emission factors for Sweden (Brander et al., 2011).

The project can hence be argued to have achieved the goal of a more energy-efficient street lighting on the walkway, and thus also contributed to an increased environmental sustainability by reducing the energy consumption and the carbon dioxide emissions.

Contribution to Alby Sustainability Objectives

One of Alby's own sustainability objectives is to renew the urban environment. With this objective, the municipality of Botkyrka aims to create development projects that are diverse, mixed and imaginative, as well as sustainable according to all three of the sustainability dimensions and must benefit the current residents (Botkyrka kommun 2009). This goal of renewing the urban environment can be argued to have been achieved through the new lighting system and the images projected on the pathway. The new lighting system has not only led to a more attractive and safe environment but has also, especially when referring to the projected images, contributed to a more imaginative environment. The objective of renewing the urban environment also includes making changes to the urban environment to make it a safer and more secure place to live and work in, as well as assuring that all new urban development should be climate-smart and designed in an appealing and challenging way (Botkyrka kommun, 2009). This part of the objective can be argued to have been fulfilled as part of the ULL 'New light on Alby Hill'. The light installations are energy-efficient and climate-smart.

Economic sustainability

The cost of the new lighting (LED-lights, LED-spotlights and LED-gobos), including the installation and test lighting was 422 840 SEK. The CEA shows that the cost per saved kWh is 5 SEK, which gives the new lighting a payback period exceeding the lighting's lifespan of about 20 years (approx. 80 000 hours). The cost per saved kWh is also greater than the savings that the municipality currently is doing based on the reduced energy consumption, which is 0.90 SEK per kWh (average energy price in 2015). Only on the basis of energy savings, the new lighting is thus not rational from a purely economic perspective, especially as long as the electricity price is low.

However, the aim of the project was to improve the walking environment around the path by providing projections of art on surrounding surfaces and improving the lighting conditions. This functionality comes in addition to the energy savings. The value of publicly displayed art is difficult to be measured in money. Nevertheless considering the positive feedback and the importance of the path to pedestrians in the area, the price can be deemed to be reasonable in comparison with the benefits.

The relatively high cost of the new lighting is mainly due to the difficulty to find a suitable LED product and technology provider. Since ambient light is a completely new way of working with street lighting, the market so far lacks cheap dimmed LED street lights that are good enough to create an ambient light of good quality. As it was the imperative to create both energy-efficient and attractive street lighting using ambient light that contributes to a greater sense of security, a more expensive LED luminaire with satisfactory louvers was chosen. However, cheaper products are under development, and there is great potential that using LED-products that facilitate ambient light will become a more economically sustainable choice in the future.

4.3.2 Evaluation of fulfilment of the Urban Living Lab definition

The evaluation of if ULL 'New Light on Alby Hill' has lived up to the definition of an ULL takes its point of departure from the definition presented in 3.1.2. The evaluation focuses on if/how residents and other stakeholders have been integrated and active partners in the whole process - when developing, planning and implementing the ULL - to solve challenges in the urban areas. Other aspects of the ULL approach, such as if/how the ULL has been developed

in the real use context and how invited participants have experienced their participation, will also be discussed.

The first feature of an ULL is that it should integrate researchers, public organizations, residents and companies to co-develop new solutions, in this case the new street lighting. In 'New Light on Alby Hill', a broad variety of stakeholders, users and organizations have been involved in the project from beginning to end to develop the new street lighting based on ambient light and light installations. The ULL has integrated researchers (IVL, College of Art), public organizations (municipality of Botkyrka and local school), companies (housing company MittAlby and LED-technology suppliers), non-governmental organisations (Resident Council and local organizations) as well as users (residents in Alby and on Alby Hill).

IVL, the municipality of Botkyrka and the housing company MittAlby have been the main drivers behind the ULL as project partners together with the College of Art. Other mentioned stakeholders and users have been involved in different stages of the process, but most (however, not all) of the decision-making have been made by the ULL project partners, based on the input from stakeholders and users.

In the development and planning of the ULL, the newly founded Resident Council on Alby Hill, a participatory forum for residents towards the housing company MittAlby, was an important stakeholder. They were at an early stage invited for a meeting giving their input and thoughts on the ULL planning based on their local knowledge and expertise. Two representatives from the Resident Council joined the meeting. The representatives from the Resident Council gave their feedback on how to reach and communicate best with the residents in Alby and on Alby Hill, the theme for the image competition and gave their views on aspects that needed to be considered concerning the sense of safety. The Resident council representatives also underlined the importance of engaging youth in the area in the project and suggested to contact the local school as many of the students use the pathway as school way. In the next step, based on the input from the Resident Council, the ULL project partners contacted the local school (art teacher), youth clubs and a local youth project focused on creative activities. The aim was to get these stakeholders' input on the ULL planning but also to give them information about the ULL and create an interest to participate. As a result of the meetings, cooperation was started with the local school to make the image competition a part of the students' art class. Also, other key stakeholders targeting youth encouraged the ULL project partners to use their communication channels to engage young residents. Hence, the participation from stakeholders as active partners in the development and planning process of the ULL gave valuable insights and suggestions which helped to further adapt and shape the project according to real use context.

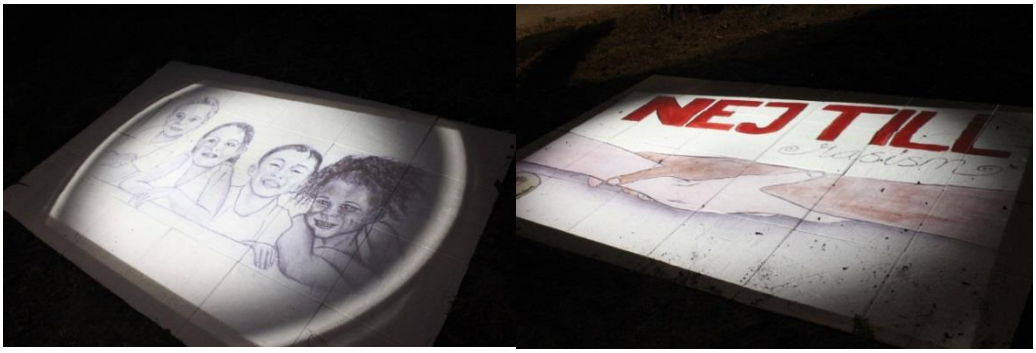
During the implementation process of the ULL and the development of the new street lighting, the users (residents including students in Alby) as well as the representatives from the Resident Council were the main participants. Their input to the implementation process was primarily a direct involvement. The Resident Council representatives participated in the test-lighting of different LED-technology products, together with lighting experts from the municipality of Botkyrka and Collage of Arts. The aim was to test how well the LED-lighting products lived up to create an attractive ambient light along the pathway. Three test-lighting occasions took place during evenings before the appropriate LED-technology and products were identified and decided on.

The residents in Alby and students at the local school (also residents in Alby) were involved in the implementation process by submitting images on the theme 'Our Alby' and later by voting on their favourite image to be projected as a light installation along the pathway. To engage and encourage residents and students to get involved in the project, information about the project and the possibility to participate was widely communicated. To give information

and encourage the resident to submit images to the competition, an information leaflet was distributed to all 1300 apartments of Alby Hill as well as put up as posters in public spaces around Alby. Furthermore, the information was disseminated through different existing communication channels provided by the municipality (e.g. municipality website, Facebook and different networks) and earlier contacted stakeholders (e.g. youth organization and youth club). A press release was also published and picked up by the local media. A similar communication effort was repeated a few months later to give information and encourage the residents to vote on their favourite image to be projected along the pathway (see Picture 1).

Picture 1: Information leaflet and poster to encourage residents to get involved

All together 20 images were submitted by residents, of which 18 were submitted by students at the local school, to the image competition. Six finalists were selected by the ULL project partners. The two winning images (see Picture 2) were selected by approximately 100 residents that voted through the website and via QR-code. Both winning images had an equality theme, focusing on all people's equal right and anti-racism. Four additional images submitted by the students at the local school were selected by a jury consisting of representatives from the ULL project partner organizations. These images were to be rotated on two of the four projection locations. Hence, during the implementation of the ULL, the users (residents) were active partners in the process to develop the new street lighting; both in terms of the ambient light and the projection of images. The users have also been the target for evaluation, under and after the implementation of the new lighting.



Picture 2: Winning images from online & QR-code voting

The users of the pathway as well as students of the local school (creators of images) were also evidentially involved in the evaluation process of the ULL by responding to the questionnaire surveys. Through the questionnaires the users and students had the possibility to state their opinions but also to give feedback on the process and activities.

Another important feature of an ULL is that the solutions should be developed and evaluated in the real use context. The participation by residents and other stakeholder and the fact that the development, and evaluation, of the new lighting has taken place on-site has allowed it to be developed in the real use context. One aspect that had a large effect on the development of new lighting was the access to suitable LED-technology. As the approach of ambient light was new (and innovative) it was challenging to find a cost-effective and suitable LED-product. As a consequence, three field-tests were needed to take place thus postponing the planned deadline for the new lighting. The delivery time for the chosen LED-products was also longer than for more traditional products, further postponing the project according to the initial time plan. This did in turn influence the image competition and voting time that were hence prolonged.

The ULL feature concerning the participation and the feeling of influence and engagement of involved residents has already been discussed in above in section 4.3.1. However, it should be noted that for ULL 'New Light on Alby Hill' the participation has been wide and information about the project and the possibility to participate has been disseminated to a large number of residents via different communication channels. The aim was to inform as many as possible about the possibility to participate, however, it was not expected that all informed residents would be interested in participating.

Has the ULL 'New Light on Alby Hill' then lived up to the definition of an ULL and allowed for a valid involvement of residents and other stakeholders? The ULL can be argued to have lived up to the ULL definition to a large extent. A variety of different stakeholders, users and organizations, including research institutions and public sector, have been integrated in the project. Beside the ULL project partners, also users *and* stakeholders have been active partners in the whole process. Stakeholders such as the Resident Council, youth organization and local school were to a larger extent involved in the planning of the ULL, while the users (residents including students) were mostly involved in the implementation of the ULL, i.e. in the development of the new lighting. Hence, users only cannot be stated to have been active partners in the whole process (see ULL feature). The involvement of residents and stakeholders as well as the development of the new lighting on-site has allowed the ULL to be adapted and changed according to the real use context. The participation has been rewarding to the ULL project partners, stimulating learning between the ULL project partners. The results of the questionnaires distributed to users of the pathway and students in the local school indicate that the participation has been somewhat rewarding to some of the involved participants, but no general conclusions can be drawn based on these results.

4.3.3 Continuation

The ULL ended in March 2015 as the new ambient light was installed and the light installations were projected along the pathway for the first time. It was decided by the municipality (owner of and responsible for the street lighting) and housing company MittAlby (owner of and responsible for surrounding land and buildings) to keep the winning images projected on the stone walls (the four images from the school selected by the jury being alternated on the two stone walls every few months) and pavement until the end of the year 2015. For 2016 and ahead, it is the responsibility of the housing company Mitt Alby to decide on new images to project while the municipality is responsible for the installation of the images to be projected. How the images are decided on is up to MittAlby, but discussed suggestions were to organize another image competition or to cooperate again more closely

with the local school or other local stakeholders. Light installations are also planned by the municipality for other areas to reflect the identity of these areas.

Concerning using ambient light, more lighting projects are underway (with more or less involvement of residents) in other areas in Botkyrka, where ambient light with help of new LED-technology will be used. The lighting experts from the municipality and from the College of Art are confident that the use of ambient light will become more popular and frequent in municipalities around Sweden in the near future.

4.3.4 Lessons learned and conclusions

'New light on Alby Hill' can be argued to have contributed to both social and environmental sustainability by increasing the sense of security among women, laying a foundation for continued participation among residents and decreasing the energy use of the street lighting along the targeted pathway. Although the impact on sustainability is minor, as the ULL has been small-scale, it indicates a potential for up-scaling, both in Alby and other urban areas, for a larger impact on sustainability. Previous studies confirm some of the effects of improved street lighting, especially on sense of security, and involving residents in the up-lifting which further highlights its potential contribution to social sustainability. However, as other studies also underline, the sense of security in an area or along a pathway depends on more aspects than just street lighting. There is hence a need to work with security issues on "several fronts". Further research also needs to be made about the effect of the new approach of ambient light on the sense of security and other psychological aspects.

The energy savings (2160 kWh/year) and emission reduction (50 kg CO_2/year) might seem insignificant in the scheme of things, but they show great potential. If similar energy efficiency improvements would be conducted at multiple pathways and areas in Botkyrka, and in other municipalities around the country, this measure would in a long-term contribute to a significantly lower energy use within municipalities. The project 'New light on Alby Hill' could also serve as inspiration for implementing similar projects, using ambient light and images for energy efficient street lighting, while a pathway or area is renewed.

From a strictly economic perspective, the new lighting cannot be considered to be sustainable as the cost is not justified by energy savings. It is, however, important to emphasize that economic perspective is only one of the three sustainability perspectives considered, and that there was no direct economical objective set. Rather than aiming to reduce energy use, the main aim was the improvement of the pedestrian path with better lighting and displaying art on surrounding surfaces.

From an ULL point of view, it is also possible to argue that ULL 'New Light on Alby Hill' has allowed for a co-development with a variety of stakeholders, where stakeholders and users have been active partner in the whole process, and is a good example of how to work with an ULL on a small-scale project developing a new solution (i.e. new lighting). The new lighting was also developed and evaluated in a real use context, on-site and together with its users. Some challenges with the ULL approach, however, became evident along the process. For example, an ULL applied to a modernization solution must be flexible to be adapted based on input from a variety of stakeholders and to the real use context. This can be difficult as a solution for renewing a suburb, such as the new street lighting, has a project plan including a time plan and a budget to consider. In the case of ULL 'New Light on Alby Hill', it was difficult to find a suitable LED-technology product within the budget and get it delivered within the time-frame and according to budget. This in turn had an effect on the involvement of residents and stakeholders as the deadlines for communication, submitting images and voting were postponed at several occasions, which can be confusing to participants. Another challenge is that the evaluation of an ULL, especially concerning its

impact on social sustainability, is complicated and needs several different methods and approaches to get reliable results.

4.4 Evaluation of Urban Living Lab 3 in Alby

4.4.1 Summary of the Urban Living Lab

ULL 3 'Vacant Space Alby', implemented September 2014 – September 2015, focused on identifying possible temporary (10-15 years) uses for a vacant space in Alby Centre, together with residents and other stakeholders. The vacant space, a former school ground, had been empty and not in use since the school located on the space was demolished in 2009. A long-term plan for the space was to build residential buildings. However, since the area would be affected by the lowering of the connecting Alby Road, a measure that was planned to take place in 10-15 years' time when the road had reached its service life, the space needed a temporary short-term use. Residents and other stakeholders have been involved in the ULL using workshops, interviews and online-discussions on the ULL website. The suggestions for the temporary uses of the space, developed together with residents and other stakeholders, have been summarized in a report, together with ideas on financing, and submitted to the decision-makers in Botkyrka municipality.

The ULL 'Vacant Space Alby' was implemented by the SubUrbanLab project partners in Sweden, IVL and Botkyrka. From Botkyrka municipality the involved organization was the Alby District Group. The Alby District Group is responsible for strategic planning of the developments in the district, in dialogue with residents and other stakeholders. Their task is also to coordinate the different stakeholders in the district, including the different municipality administrations and companies and their cooperation partners, to ensure that their regular assignments are implemented successfully. Alby District Group consists of representatives from all municipal administrations, the police, the local housing companies and the local culture cluster Subtopia. A project group, with appointed representatives from four different municipality departments, was created as the main responsible group for the planning and implementation of the ULL 'Vacant Space Alby'.

The objectives for the ULL were developed in discussion between IVL and Botkyrka municipality (Alby District Group) in the development and planning stage of the ULL. The objectives for the ULL 'Vacant Space Alby' were:

- to develop and test the Alby District Group's ability as an organization to carry out an ULL regarding a planning;
- to try new methods for participation (web based);
- (to develop a number of suggestions for possible temporary uses for the vacant space)[4]

The sustainability objectives in Alby relevant for the ULL 'Vacant Space Alby' are:

- Trying out new working methods at the municipality

For more detailed information on the selection and implementation of ULL 'Shape Your World', see reports *Selection of Urban Living Labs in Alby and Peltosaari* (Karlsson et al., 2015) and *Establishment and implementation of Urban Living Labs in Alby and Peltosaari* (Karlsson et al., 2016) (available at www.suburbanlab.eu).

4.4.2 Evaluation methods

The ULL 'Vacant Space Alby' has mainly focused in trying new working methods and organization for the planning of an urban vacant space together with residents and other stakeholders. Hence, the main evaluation methods have been qualitative in order to evaluate how well the ULL allowed for trying new working methods. In order to evaluate the ULL's

[4] The third objective will not be evaluated since it is not relevant for the evaluation of contribution to sustainability or fulfilment of ULL definition.

contribution to sustainability (ULL objectives, Alby sustainability objectives and economic sustainability) the focus group discussions and questionnaires have been the main methods of the evaluation.

Focus group discussions

A focus group discussion took place in May 2015 together with around 15 representatives from the Alby District Group and representatives from municipality administrations. The focus of the discussions was on evaluating the Alby District Group's ability as an organization to carry out an urban planning project using an ULL approach (ULL objective). Questions such as "*What has the main advantages and possibilities respectively main barriers and obstacles been with the Alby District Group carrying out an planning ULL*" and "*Should the Alby District Group carry out similar processes in the future?*" were discussed. Detailed meeting minutes from the discussions were used as basis for the evaluation. It should also be noted that residents and representatives from Alby organizations taken part in the workshops were invited to another meeting to discuss the results, with the aim to also have a discussion related to evaluation of the ULL. However, due to lack of interest among the previous workshop participants the meeting was cancelled. Instead, a web survey was carried out targeting the concerned workshop participants (see below).

Web survey

A web questionnaire was sent to all residents and 16 resident group representatives that had participated in the workshops organized as part of the ULL. The web questionnaire contained a number of questions about the participants' experience of being involved in the process, their willingness to participate in similar processes in the future, as well as their view of using web-based methods for resident participation. Four responses were received after several reminders.

Documentation

The main method for evaluating the fulfilment of the project's ULL definition has been continuous documentation of all phases of the ULL, such as meeting minutes and e-mails, as well as interviews with key stakeholders. The whole process of developing, planning and implementing the ULL is described in the reports *D 3.1 & 3.2 Selection of Urban Living Labs in Alby and Peltosaari* (Karlsson et al., 2015) and *D 3.3 Establishment and implementation of Urban Living Labs in Alby and Peltosaari* (Karlsson et al., 2016) which is the basis for the evaluation of fulfilment of ULL definition.

An evaluation has also been made concerning the use of the interactive website OWELA by following up the number of unique visitors and discussion entries.

4.4.3 Evaluation of the Urban Living Lab's contribution to sustainability

The evaluation of the ULL's contribution to sustainability is divided according to the three dimensions of sustainability: environmental, social and economic sustainability.

The objectives set up for this ULL and the relevant Alby sustainability objective (see 4.1.1) focus mainly on social sustainability, or more specifically on trying new working methods and organizations for a sustainable planning of urban areas together with residents and other stakeholders. Therefore the focus for this evaluation of contribution to sustainability is also on the social dimension. However, contributions to environmental sustainability and economic sustainability are also addressed.

Social sustainability

Develop and test the Alby District Group

The first objective set up for the ULL was to develop and test the Alby District Group's ability as an organization to carry out an urban planning together with residents and other stakeholders through an ULL. As previously mentioned, one of the tasks of the Alby District Group is to coordinate the different stakeholders in the district to avoid duplication of work and promote cooperation and synergies. What makes the Alby District Group unique in the municipality organization is that the work is cross-administrational: all municipality administrations work together on equal terms but it also invite other organizations, such as the police and housing companies, to take part. The Alby District Group is also responsible for strategic planning of the developments in the district, in dialogue with residents and other stakeholders.

The Alby District Group, with the District Developer as a key actor, has previously been involved in other dialogue projects targeting residents and other stakeholders. Previous dialogues include the participation of residents and stakeholders in the development of Alby Long-term Programme for Sustainable Development (Alby sustainability objectives) and the development of Alby Stadsbyggnadsidé (long-term plan for the urban development of Alby). The Alby District Group had, however, never been the main driver or organizer behind urban planning projects themselves. Such assignments are traditionally assigned to the Building Environment Administration, who then consults the District Group's local expertise and network to involve residents and other stakeholders. The process and decision-making is hence mainly controlled by one municipality administration. The ULL 'Vacant Space Alby' is the first time that such an assignment, delegated by the municipality to the Alby District Group, enables the municipality to try new inter-administrational working methods to carry out urban planning together with residents and other stakeholders.

The evaluation from the focus group discussions with Alby District Group representatives and other municipality representatives show that the overall opinion is that the District Group, based on the experiences from the ULL 'Vacant Space Alby', is a suitable organization with the ability to develop plans and suggestions for urban areas together with residents and other stakeholders based on their needs and wishes. It was highlighted during the discussions that the District Group has a unique possibility through its cross-administrational organization to collect needs from different parts of the municipality as well as other organizations and to find synergies between different needs and demands. Furthermore, the District Group already has a wide trust capital with networks and contacts that facilitated the process and effectively enabled a successful dialogue with residents and other stakeholders. As an organization working locally and close to its citizens, the Alby District Group has the practice of providing the residents with feedback of results. This is seen as a corner stone in keeping and building trust among residents and stakeholders. This practice differs from a more traditional organization of a similar process, which often lacks local knowledge and networks with fewer incitements to give feedback to involved participants. The representatives from the municipality also underlined in the evaluation that if the same process had been carried out in the traditional way, in a "buy" and "sell" organization of resources between municipality administrations, the process would have been more costly and needed more time. To carry out the process through the Alby District Group instead allowed for more flexibility and a more time-effective process.

The evaluation hence indicates that the District Group has the ability and is a suitable organization to carry out a "co-creation" with residents and other stakeholders (within and outside the municipality) for developing ideas and urban plans based on needs and wishes. It was emphasized in the focus group discussions that this "model" has a lot of potential and can also be used in other contexts beyond the co-creation of ideas for this particular vacant space.

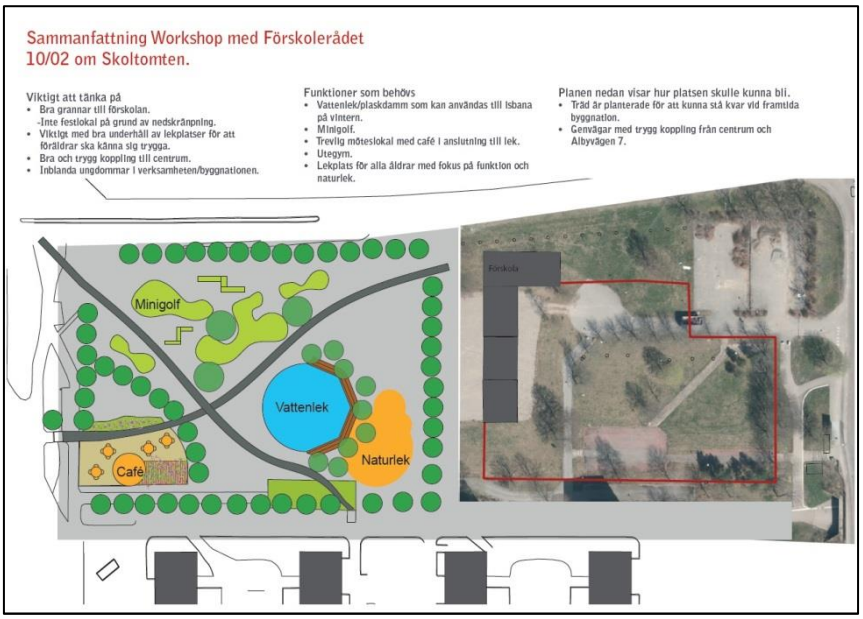
Most potential is perceived for processes of planning the renewal and upgrading of already existing areas, as the process for new-built areas is somewhat different. However, it was also highlighted by representatives from the municipality that the District Group is not a suitable organization to carry out ULL for all types of projects. For example, in projects regarding more detailed planning or more large-scale implementation of solutions for renewal of an urban area, other organizations with more technical expertise need to be in charge of the process and those processes also might not include participation of residents in any wider sense.

In the evaluation it was also underlined that, through the ULL, the District Group has not only tested but also developed their ability to carry out planning processes at an early stage. One of the boundary conditions of the ULL approach that was highly valuable and instructive to the District Group, and something that had not been part of their regular work when previously involving residents, was the effort put on discussing common objectives and expectations with the process. This way of working was very appreciated by the involved representatives from the Alby District Group. The experiences from ULL 'Vacant Space Alby' have also provided experiences and lessons learnt that can further develop similar processes by the District Group in the future. For example, it was highlighted that the ability of the District Group to carry out this process depends largely on the capacity and capability of the District Developer and the resources provided to the project group within the Alby District Group. For 'Vacant Space Alby' no additional resources were given but involved persons from the municipality were expected to carry out the ULL alongside other daily tasks. The support from IVL throughout the process was hence vital for the implementation of the ULL as daily tasks take up most of the working time of the representatives from the Alby District Group. Thus, to carry out similar processes in the future, beyond SubUrbanLab, the representatives in the District Group need to be allocated more resources (mainly working hours). Another experience put forward, indicating a need for more development in a next step, was the uncertainty that sometimes occurred regarding the mandate of the Alby District Group. For example, it was unclear if the District Group could make decisions related to the vacant space that contradicted decisions already made in other administrations. The mandate of the District Group in relation to municipality administrations hence needs to be further discussed for future planning processes involving residents and other stakeholders. One last lesson learned expressed during the focus group discussion, needing further exploration for the Alby District Group carrying out similar processes in the future, is the risk to loose trust capital among residents and stakeholders as the District Group have no mandate for saying how the results from the planning (in this case, the suggestions for temporary uses and activities) are taken forward and if the suggestions will be implemented or not. If the suggestions from the residents and stakeholders are not taken into consideration in the further planning or implementation of the vacant space, residents' and stakeholders' trust in the District Group might be weakened.

To conclude, it can be argued that the ULL has successfully developed and tested the Alby District Group's ability as an organization to carry out an urban planning together with residents and other stakeholders through an ULL. The overall conclusion is that the District Group has the ability, and is a suitable organization, to carry out an ULL for developing plans and suggestions for urban areas together with residents and other stakeholders based on their needs and wishes. The evaluation results show that this could be a new working method for the Alby District Group (and other District Groups in Botkyrka municipality) but it needs to be further developed based on the experiences and lessons learned from ULL 'Vacant Space Alby'. If ULL will be used as a new approach for resident and stakeholder participation for the District Group in a long-term cannot yet be evaluated.

To try new methods for participation (web based)

A second objective with the ULL was to try new methods for residents and stakeholder participation, more specifically to try web-based methods using the interactive online platform OWELA (provided by VTT). In the planning process of the ULL, a website (www.albyskolanstomt.se) using OWELA was set up for the ULL. The aim with the website was twofold. One aim was to disseminate information about the co-creation process and to make information available to all residents online. The second aim was to enable discussions and co-creation online complementary to the face-to-face interviews and workshops. After the residents' interviews (summary) and each workshop, the suggestions were summarized and illustrated (see Picture 3 as example) and uploaded onto the ULL website. For each summary and illustration of suggestions, an online discussion was enabled through a commenting feature. To inspire online discussion, the participants from each workshop were encouraged to continue their discussion online and they were sent a link to the relevant web page after the material had been uploaded. Also other visitors of the webpage were encouraged to provide ideas, suggestions and opinions online when entering the website.



Picture 3 Summary and illustration of suggestion made by the Parent Association during one of the workshops

An evaluation of the number of visitors at the interactive website shows that during the implementation of the ULL (until end of 2015) the website had 414 unique visitors. Looking at the number of discussion entries on the website, there was no continuous discussion online based on the suggestions from the workshops and interviews. Only two comments were made, one in connection to the suggestions made by Alby residents during the interviews and one in connection to the suggestion and illustrations from the first workshop with mainly municipality representatives and local business representatives. Hence, the interest to participate in the co-creation via the ULL website was low. Instead, the website was rather used by residents and stakeholder in a more traditional way, i.e. to get information about the ULL. Compared to the total population of Alby, the number of visitors to the website could be considered low.

In the web survey carried out among the workshop participants after the implementation of the ULL, questions were asked regarding their view on the interactive website. Four participants responded to the web survey. One of the four respondents stated to have visited the website to read about the results from the workshop(s), the others had not visited the website. On the question if they found a website a good channel to disseminate information

about the ULL 'Vacant Space Alby', one respondent expressed that the website was a good channel for information dissemination while the other respondents did not think so (1) or did not know (2). In a comment made by the respondent that did not find the website a good channel for information, the respondent expressed that a website only enables people who actively seek information to receive information and that more effort should be put on actively spreading information to more residents in Alby through other channels. On the question if the respondents found a website a good way to provide comments and suggestions concerning the vacant space in Alby, two respondents were positive while two respondents did not know. As the number of respondents is very low, these results need to be interpreted with caution and not much emphasis can be put on the results.

The results from the evaluation of using web-based methods to involve residents and other stakeholder show that it was not a successful method as a part of ULL 'Vacant Space Alby'. The interest in discussing online was low, and the website requires residents to actively seek information, which in practice could exclude many residents (note, however, that other information dissemination efforts were also carried out as a part of the ULL).

Contribution to Alby Sustainability Objectives

The ULL 'Vacant Space Alby' can also be argued to have contributed to increasing social sustainability in Alby by addressing the Alby sustainability objective 'Trying new working methods at the municipality'. As previously mentioned in Alby ULL 2, the objective underlines the need to try new working methods in the municipality to explore new knowledge and to collaborate with residents in new ways. The objective also puts focus on the need for increased "*inter-administration co-planning*" (Botkyrka kommun, 2009). The ULL 'Vacant Space Alby' has addressed the Alby sustainability objective by enabling the Alby District Group to try and develop its ability to carry out co-creation planning of urban spaces in a successful way. This way of cross-administrational working has a potential to become a new general method in the future for developing plans and suggestions for urban areas together with residents and other stakeholders based on their needs and wishes. With the lessons learned from ULL 'Vacant Space Alby', this way of working can also be further developed and explored.

Environmental sustainability

For this ULL, there was no contribution to environmental sustainability as the focus was on the *planning* of a vacant space. That is, there has been no implementation of a physical action or solution. However, environmental sustainability could be discussed as a long-term impact depending on what will be implemented on the vacant space and if/how the suggestions for temporary uses are realized. The suggested temporary uses for the vacant space developed have taken into consideration environmental aspects and in the report it was highlighted that the temporary uses must live up to Alby sustainability objectives regarding creating "*a resource-efficient urban district that has minimal environmental impact, further contributing to sustainable development*" (Botkyrka kommun, 2009).

Economic sustainability

Economic sustainability was not an objective in the ULL "Vacant Space Alby". However, the suggestions for temporary uses put forward to the municipality as a result of the ULL also took into consideration if the suggestions were economically viable. Furthermore, if the developed suggestions are later implemented on the vacant space, it would probably increase the attractiveness of the area and, as a potential consequence, increase the interest to invest further in the area. One must also consider here the economic sustainability of *not* developing the vacant space but keeping it vacant.

The ULL "Vacant Space Alby" may also potentially affect economic sustainability if the ULL approach is implemented as a new way of working for the Alby District group for similar projects. As underlined during the evaluation, to carry out the planning process through the Alby District Group using an cross-administrational ULL approach, inviting residents and stakeholders, instead of the normal "sell" and "buy" organization allowed for a more flexibility and a more time-effective process (and potentially also more cost effective).

4.4.4 Evaluation of fulfilment of the Urban Living Lab definition

The evaluation of if ULL 'Vacant Space Alby' has lived up to the definition of an ULL takes its point of departure from the definition presented in 3.1.2. The evaluation focuses on if/how residents and other stakeholders have been integrated and active partners in the whole process - when developing, planning and implementing the ULL - to solve challenges in the urban areas. Other aspects of the ULL approach, such as the if/how the ULL has been developed in a real use context and how invited participants have experienced their participation, are also discussed.

The ULL 'Vacant Space Alby' can be argued to have integrated a variety of stakeholders and organisations to co-develop the new solutions and services, i.e. suggestions for temporary uses of the targeted vacant space in Alby. The ULL has integrated researchers (IVL), public organizations (municipality of Botkyrka), companies (Subtopia, housing companies), non-governmental organisations (civil society organizations in Alby) as well as users/residents (mainly future users of the vacant space).

As previously mentioned, the ULL project partners consisted of IVL and the Alby District Group with the District Developer as the key person in the District Group. A number of District Group representatives were selected to join the District Developer in the appointed project group. Hence, IVL and Alby District Group were the main drivers behind the process of developing, planning and implementing the ULL. But other stakeholders (as stated above) were also involved and gave their input in the different stages of the process. However, the final decisions were made by the ULL project partners, based on the input from residents and other stakeholders.

The development and planning process of the ULL mainly involved the ULL project partners IVL and Alby District Group, represented by appointed responsible members of the group. IVL and the project group from Alby District Group met on several occasions to discuss how to set up the ULL, involve important residential groups and stakeholders, choose suitable methods for the co-creation with residents as well as channels for communication about the process. The previous experience from the District Group in facilitating and carrying out resident participation was a valuable input in the planning, such as experiences on resident's motivation to participate and which participation methods previously had been successful. During these discussions, decisions were made on how to implement the ULL, such as the decision to set up the interactive website for the project and to organize a workshop tour with identified key stakeholders and residents. The planning was also discussed internally during regular District Group meetings when all District Group representatives (including Alby stakeholders such as housing companies and civil society organisations) were present and could give their input to the ULL planning. The active participation of users and stakeholders, beyond the Alby District Group, was hence not present.

During the implementation process, i.e. the development of suggestions for temporary usages of the vacant space, a number of residents and stakeholders (as future users of the space) were involved. Around 250 residents in Alby residing around public places (Alby Centre, Alby metro station etc.) were interviewed, answering the question "*What do you think the former Alby school ground should be used for*?". Moreover, a workshop tour of five workshops was organized with identified key residents and stakeholders in order to discuss their wishes and

needs for the vacant space in the future, but also about how the space was currently used. The residents and stakeholders who participated in the workshops (one per stakeholder/resident group) included municipality representatives from all administrations and local business, Association of Alby Organizations, the youth sport organization Konyaspor, Alby Parents' Organization and a group of young women. Residents living in the buildings surrounding the vacant space (including The Swedish Union of Tenants) and youths from the new Alby Youth Club 'Grunden' were also invited for workshops, but the workshops got cancelled due to low interest. After 250 interviews and five workshops with key stakeholders and residents, the ULL project partners experienced that similar or same suggestions had recurred between workshops, indicating that most needs and wishes had been raised.

All in all, around 45 persons took part in the workshops, giving their view of what the vacant space temporarily could be used for. Residents were also informed about the possibility to give input online via the ULL website, both as information on the website but also through information leaflets targeting the residents in buildings around the vacant space. However, only two suggestions were submitted through the website (see also 4.4.3). Most frequent suggestions from the residents and stakeholders through the interviews and workshops included temporary residential buildings for youth or students, a park with different activities and functions as well as services such as a cafe. The residents and stakeholders also gave their input on important aspects to consider regarding the temporary usage of the vacant space, for example that it should complement and not compete with the surrounding activities (e.g. new Public Health Park and commercial activities at Alby Centre) and that the space needed to be perceived as a safe space to use or pass by during all hours of the day. The input from the residents and stakeholders was then summarized and two suggestions for a temporary use of the former Alby school ground, based on the residents and stakeholder input and wishes, were developed. The suggestions - a combination of temporary apartments and facilities with daring architecture and aesthetics, as well as a park with different functions - were presented in a report and submitted to the General Director of the municipality as well as disseminated to all workshop participants and uploaded to the website as feedback. Hence, during the implementation of the ULL, the future users (residents and other stakeholders) were active partners in the process to develop the suggestions for temporary uses of the vacant space.

The targeted stakeholders were also involved in the evaluation process of the ULL by being involved in evaluation discussions (focus groups) and through the web survey. It should, however, be noted that the interest from especially residents and residential groups in taking part in the evaluation (web survey) was low. One reason for this, the same as with using the interactive website set up, can be the non-habit of participating via Internet. Another reason might be that the web survey was sent more than six months after the workshops had taken place and that the commitment or interest had decreased during this time (the participants had "moved on").

Another important feature of an ULL is that the solutions are developed and evaluated in a real use context. As the ULL 'Vacant Space Alby' has focused on coming up with ideas for temporary uses of the vacant space, and not developing practical solutions on-site, the link to the real use context is somewhat weaker. However, the development of ideas (including continuous evaluation of the ideas in the ULL project group) for temporary solutions has been carried out in connection to an existing physical place (the vacant space) inviting future users of its activities or uses. The local context has thus been important. This indicates that the solution (temporary usages and activities) has been developed (and evaluated) with a real use context in mind.

In the questionnaire sent out to the workshop participants, questions were also asked regarding how they had experienced their participation in the ULL. On the question '*To what extent do you feel that your knowledge, experience and ideas has been taken into*

consideration in the development of suggestions for temporary usages of the vacant space?', two of the respondents stated that they feel that their input has been taken into consideration only to little extent while one respondent felt that his/her input had been taken into consideration to a larger extent (one respondent did not know). Although the number of respondents is very low, this indicates that the participants do not fully feel that their input has been listened to. This could have several causes, for example that the feedback from the ULL project partners was insufficient, or the fact that nothing has yet happened on the vacant space since the workshop. Although the respondents did not feel to any large extent that their input had been taken into consideration, the respondents stated that they would like to participate in more dialogues about the development of Alby in the future, which indicates that the participation should have been somewhat rewarding. However, as the number of respondents is low, the results should be considered with caution.

Another thing worth mentioning is that residents and stakeholders, that participated and were engaged in workshops, were mainly already active citizens: all four respondents has previously been participating in dialogues about Alby, while more 'passive' residents were reached with interviews carried out with residents in public outdoor spaces. Hence, both active residents (to large extent active in residential organizations) and more passive residents were reached with the chosen participation methods of the ULL.

Has the ULL 'Vacant Space Alby' then lived up to the definition of an ULL and allowed for a valid involvement of residents and other stakeholders? The ULL 'Vacant space' can be argued to have lived up to the definition of an ULL to some extent, but not fully. The ULL has integrated a variety of stakeholders, including users and public organizations, in the co-development of suggestions for temporary usages of the vacant space in Alby. The ULL has, however, not fully allowed the users of the future temporary uses (or other stakeholders) to be active partners during the whole process. Future users and other stakeholders have been actively involved in the implementation and evaluation process of the ULL, but not for developing and planning the ULL. Hence, the ULL 'Vacant Space Alby' has not lived up to the feature of active user involvement during the whole process. Although the ULL focused on the development of suggestions and ideas, it can be argued to have been developed in connection to a real use context as future users were invited to give input and the local context of the vacant space was an important aspect that was taken into consideration. Concerning the participation of residents and stakeholders, it is difficult to know if the ULL has been rewarding and encouraging to the participants and encouraged learning between participants. As workshops were carried out with one resident or stakeholder group at the time, learning between participants can be expected be lower than it would have been if the workshops were mixed. The number of respondents to the evaluation questionnaire was low and it is therefore not possible to draw any general conclusions. The ULL process has, however, been rewarding to the involved ULL project partners and encouraged valuable learning between project partners.

4.4.5 Continuation

When writing this report, there has been no continuation of the ULL in terms of more detailed planning of developed suggestions for temporary uses, or implementation of suggested temporary usages. The municipality decision makers are still discussing whether to proceed with the suggestions developed as part of ULL 'Vacant Space Alby' or if the vacant space should be used for something else.

As previously discussed, the evaluation showed that the ULL approach is a suitable approach for the Alby District Group in order to develop plans and suggestions for urban areas together with residents and stakeholders. If ULL will be used as a new working method by the Alby District Group in the future is however too early to say.

4.4.6 Lessons learned and conclusions

Looking at the evaluation of ULL 'Vacant Space Alby' one can conclude that the ULL has contributed to local sustainability by addressing the Alby sustainability objective 'trying new working methods in the municipality' through developing and testing the Alby District Group's ability as an organization to carry out an ULL regarding planning together with residents and other stakeholders through an ULL. The evaluation shows that this could be a new working method for the Alby District Group, although the process needs to be further developed based on the experiences and lessons learned. If ULL will be used as a new approach for resident and stakeholder participation for the District Group in long-term is however not yet known. Another important conclusion from the evaluation is that web-based methods for participation, more specifically online discussions with residents and other stakeholders, are not mature enough in Alby to be successful co-creation methods for the planning of urban areas. To be successful, web-based methods need more efforts and time. Also, they require access to internet and computers/smartphones which is not always the case. The limitations to web-based discussions as a participatory method may also be true for other suburban areas.

From an ULL approach point of view, the ULL 'Vacant Space Alby' has not fully allowed for an active participation of users and stakeholders in the whole process, which is one of the main features of an ULL. The involvement of users and stakeholders was not sufficient during the development and planning process of the ULL. One reason for this is that the ULL 'Vacant Space Alby', unlike the other ULLs in Alby, was driven mainly by the municipality (via Alby District Group) and that user participation in planning of an ULL (or other citizen dialogues) is not in line with the current decision-making and working structures of the municipality. As with Alby ULL 1 'Shape Your World' a question can be raised here if an active involvement of residents and stakeholders earlier in the process would have facilitated to better identify, for example, more appropriate communication channels and methods for resident and stakeholder participation and hence helped in engaging more and other residents and stakeholders.

Other challenges that could be highlighted in connection to an ULL focusing on planning of solutions, as ULL 'Vacant Space Alby', and not on-site development and implementation of solutions, is the risk to loose trust from residents and other stakeholders. If the suggestions developed during the ULL process are later not considered or implemented due other decisions made by the decision-makers in the municipality beyond the ULL, this might decrease trust for the municipality and discourage future engagement. Hence, it is very important to have the support by relevant decision-makers for the ULL process and its results before the process starts. However, the political context in a municipality can change during an ULL process (ULL 'Vacant Space Alby' process lasted for about a year from development to evaluation) during which the support from decision-makers can change or other prioritization be made.

Also, when users and stakeholders are an integrated part of the evaluation (as is the case with an ULL) the evaluation can also be limited by the engagement and participation of residents and stakeholders. This is visible in the evaluation of ULL 'Vacant Space Alby' where it was difficult to get residents and stakeholders to participate in the evaluation – there was a limited interest among workshop participants both to attend a feedback- and evaluation meeting and to respond to a short online web survey despite several reminders. This, in turn, limits the evaluation and the conclusions that can be drawn in more general terms.

5 EVALUATION OF URBAN LIVING LABS IN PELTOSAARI

5.1 About Peltosaari

Peltosaari is a suburb in the centre of the city of Riihimäki. The city of Riihimäki is situated 70 km north from Helsinki. Peltosaari is located next to the railway station and the centre of the Riihimäki. Approximately 10 % (around 2 700 persons) of the total population of Riihimäki (around 29 000) live in Peltosaari. Half of the residents in rental housing of the city of Riihimäki live in Peltosaari.

Peltosaari was built in 1970-1980 as a pilot area for electric heating in multi-storey houses. Generally, all the electricity expenses have been included in the rent or service fees, which has led to quite high energy and living costs in the area. Most of the buildings need renovation and the privately owned housing companies have already e.g. renovated facades and roofing.

The area has a large number of social housing, the unemployment rate is higher than the city average and the average income is lower than in the other parts of the city. The city-owned rental housing company, Riihimäen Kotikulma, has not been able to carry out all the necessary renovations of the buildings.

Peltosaari has a good school and two day-care units, lots of green areas and very good public transportations and connections to the city centre. Many Peltosaari residents are actively participating in voluntary work. For example the local residents' society, Peltosaari-seura, which was founded already in 1975, operates a recycle centre/flea market in an old commercial building and arranges several other activities for residents each year.

Since the year 2000 several development projects have been implemented in order to improve the well-being of the residents and the reputation of Peltosaari. In 2010 the Peltosaari project was launched. It aims to involve the residents and other stakeholders in local cooperation and development of the area. The present project was preceded by an overall study related to the challenges and opportunities in the development of Peltosaari (Vaattovaara, Kortteinen & Ratvio, 2009) and a study of eco-efficient renewal of the neighbourhoods (Lahti et al., 2010). The Peltosaari-project is an umbrella for numerous projects with varying goals and sources of financing. The experiences and feedback gained from the previous projects have provided important input in the selection and decision making process regarding the ULLs in the SubUrbanLab project.

An architectural competition for development ideas for Peltosaari was arranged in 2010 - 2011. The winning idea was further developed by the city planners and a new general plan was introduced after discussions with residents and other stakeholders. The new plan provides an opportunity to build approximately 45 000 m^2 of new residential buildings in the area.

Environmental aspects such as energy saving in the housing stock, increasing the use of district heating and implementing solar energy systems are important parts of the new general plan. A booklet (funded by The Housing Finance and Development Centre of Finland (ARA)) with the title: 'Holistic renewal of Peltosaari residential area in Riihimäki' was published in May 2013 (Väkevä-Harjula, 2013).

5.1.1 Sustainability in a Peltosaari context

The city of Riihimäki signed the European declaration for Sustainable Urban Development, Aalborg Declaration, already in 1994. The city committed to composing a programme for sustainable development (Riihimäki Agenda 21) by the end of the year 1996. The programme was compiled in collaboration between the city, civic organizations and company representatives, and it reached its final form in spring 1997, after circulations for comment. The action programme for sustainable development in Riihimäki is available in Finnish on the website of the city (Riihimäki, 1998). The programme defined eight themes for the development activities of the city: Protecting and enhancing biodiversity and natural resources; Environmental damages and risk management; Energy saving; Conserving choices by consumers; Environmental education and communication; Internationalisation; Cultural and social sustainability; Follow-up of the programme and continuity of sustainable development.

During the years 1995-2011 the sustainable development functions of the city were coordinated by a specific committee for sustainable development. Since 2011 the coordination has been carried out by the environment committee of the city.

The city of Riihimäki has also committed to other actions for sustainable development, such as: Climate strategy 2020 – towards carbon-neutral Riihimäki and Energy efficiency contract for 2008-2016 (EU recommendation to achieve 9 % energy savings). The city publishes every year an environmental report, which presents the results of different actions.

In 2014 the city approved the following environmental goals as a part of its environmental policies and environmental system (Riihimäki, 2014):

1. Nurturing biodiversity and natural resources
2. Mitigation of climate change and preparing for it
3. Eco-efficient urban structure and traffic system
4. Increasing environmental awareness and encouraging pro-environmental attitudes
5. Management of environmental risks

The values of the city of Riihimäki are:

- Creativity
- Fairness
- Safety
- Willingness and ability to co-operate
- Environmental awareness

The vision of the city, “Good life in Riihimäki”, emphasises the viewpoint of an inhabitant of the city, basing on the following statements:

- It is safe in Riihimäki.
- It is comfortable in Riihimäki.
- Everyday life in Riihimäki is easy.
- It is easy to participate and influence in Riihimäki.
- The livelihood is secured in Riihimäki.

The strategy for 2013-2016 guides the operations of the city according to these values and objectives and defines the goals and focus areas for these years. A questionnaire to inhabitants of Riihimäki is run every two years to follow the development in the relevant focus areas and to detect any emerging topics for development. In the recent questionnaire conducted in October 2015 the inhabitants were most satisfied with their opportunities for working, the

ease of everyday life and safety in Riihimäki (Riihimäki, 2015). There was a small increase in perceived opportunities to participate and influence, compared to the earlier years.

Peltosaari project that was launched in 2010 is an umbrella for numerous projects with varying goals and sources of financing in the city of Riihimäki. The project includes initiatives where social sustainability and inclusion of citizens has been notably emphasised. The project is ongoing. The project portfolio comprises of projects 'Development programme for suburbs' (2009-2011) and 'New life of a neighbourhood' (2009-2011) where the focus was mainly on development of the area, its general plan, eco-efficiency and services but participatory approaches were used. In the project 'Renewal of housing' (2009-2012) one of the four focus areas was activating residents of Peltosaari to develop their own living environment. As a result of the project for example a housing reception was started in the area, Peltosaari Parliament was established and communication was increased. Later on more projects focusing on social sustainability have been launched: 'Youth first' (2012-2015) worked for enhancing education and employment of the youth, "LiiKuTa" (Wellbeing from exercise, culture and arts, 2013-2014) organized accessible communal activities for different groups in Riihimäki, 'Exercise for supporting integration of immigrants' (2013-2016) aims to reach especially immigrant children and families through gym and sports activities, and this project (SubUrbanLab, 2013-2016) has explored Urban Living Labs as a means to support modernization and social uplifting of suburbs through urban living labs and for engaging residents and other stakeholders into development work.

5.2 Evaluation of Urban Living Lab 1 in Peltosaari

5.2.1 Summary of the Urban Living Lab

The Urban Living Lab 'Energetic co-operation' was implemented between May 2014 and November 2015. It focused on improving energy efficiency in rental apartment buildings, both through technical solutions and through enhancing awareness of the residents and the personnel responsible for maintenance. The challenge has been that there aren't sufficiently detailed data on the energy consumption to be able to target the development efforts to efficiently decrease the energy consumption of the buildings. The representatives of the housing company at Riihimäki, the residents of the house selected for the case study and the companies providing technical solutions for managing energy consumption were involved into the ideation, development and evaluation work. Contributions from the stakeholders were gathered through numerous meetings, phone calls and emails. A questionnaire was distributed to the residents and a discussion and evaluation event with the residents was organized.

The goals of the ULL were to provide more detailed information about the energy consumption in apartment buildings in Peltosaari, to contribute to controlling the living costs, to explore solutions for decreasing the energy consumption and to raise interest of the stakeholders in saving energy and implementing solutions for decreasing energy consumption.

The sustainability objectives relevant for the Peltosaari ULL 'Energetic co-operation' are:

- Decreasing energy consumption and thus contributing to environmental sustainability and the climate and energy targets of the city
- Contributing to economic sustainability through savings in energy costs and controlling the living costs in apartments
- Reinforcing energy saving through the involvement of residents, by providing a channel for innovations, enhancing acceptability and utilisation of new solutions and improving interaction between the company and residents, and thus customer satisfaction.

However, during the course of the ULL its scope had to be frequently adjusted due to numerous challenges and obstacles that appeared along the planning and implementation. The original ideas and aims were discussed, refined and approved together with the housing company Kotikulma but the ULL didn't become a part of the company's operations and projects. That resulted in a very slow progress as the decisions and activities prepared were often postponed and it was difficult to reach the right contact persons. These challenges were probably mostly due to conflicting priorities and complex decision-making structures, since the resources needed for the ULL from the company were moderate. Eventually the ULL focused on exploring potential solutions and approaches and presenting them to the housing company, instead of co-developing and piloting solutions with stakeholders in a real context. Thus, the scope of the ULL changed from concrete activities for saving energy to co-learning and supporting (future) decisions and investments for energy saving.

The ULL was an important learning experience for the project team. The critical aspects that should be considered and confirmed when setting up a living lab were highlighted through this ULL. These are discussed in the Chapter 5.2.6.

The ULL 'Energetic co-operation' was implemented by the SubUrbanLab project partners in Finland (City of Riihimäki and VTT) and the housing company Kotikulma.

For more detailed information on the selection and implementation of ULL 'Energetic co-operation', see reports *Selection of Urban Living Labs in Alby and Peltosaari* (Karlsson et al.,

2015) and *Establishment and implementation of Urban Living Labs in Alby and Peltosaari* (Karlsson et al., 2016) (available at www.suburbanlab.eu).

5.2.2 Evaluation methods

The ultimate outcome of the ULL, learning and preparing the ground for new kinds of activities and investments within a housing company, can't be quantitatively evaluated, especially as these were not the original goals and consequently, there are no data of the initial situation and the evaluation plan was not aligned for these goals. Thus, the ULL has been evaluated mainly based on the few actions realized by the end of the project and a discussion of potential benefits of possible future activities.

The evaluation data comprises of:

- Number of presented technical solutions and the potential impact of the most promising solution for the building
- Number of participants in various meetings and discussions
- Meeting minutes
- Initiatives taken for processing at the company and waiting for decision

5.2.3 Evaluation of the Urban Living Lab's contribution to sustainability

The evaluation of the ULL's contribution to sustainability is divided according to the three dimensions of sustainability: environmental, social and economic sustainability. The main focus of the ULL 'Energetic co-operation' was on environmental and economic sustainability but also potential contributions to social sustainability are briefly discussed. The evaluation of this ULL presents mainly potential future benefits that might be achieved (and could then be properly evaluated) if the suggestions would be implemented and participatory approach would be further applied in continuation.

Social sustainability

Participation and engagement

Involvement of users (or stakeholders) in innovation and design is often motivated by the benefits for the actual (technical) development process and use phase of the solution, resulting in more accurate user requirements, features that meet the users' needs, a greater acceptance of the system and an enhanced ease of use. However, participation as such can also be valuable for the participants, by providing people an opportunity to be involved in making the decisions affecting their lives. (Friedrich, 2013) Examples of the perceived value by the participants in the research by Friedrich (2013) highlight the dimensions of participation that are not directly linked to the development work: Being able to influence, Nice way to spend time, An honour to participate, Being heard, Learning about the topic, Growing as a person, Networking.

Similarly, participation of the residents and the employees of the housing company in the ULL 'Energetic co-operation' can contribute to the individual aims of learning new things, sharing own know-how, interacting with other people and being able to influence. These were not specifically expressed in the discussions with the participants but can only be supposed. However, in the feedback discussion of the resident event the participants stated that the opportunity to learn about future plans regarding their homes and to be heard was much appreciated. Improvements on this field increase satisfaction with own living environment and its appreciation.

Environmental sustainability

Decreasing electricity consumption in the buildings managed by the housing company

The main goal of the ULL 'Energetic co-operation' was to explore ways to decrease the electricity consumption of the rental apartment buildings in Peltosaari area. Majority of the buildings have been built in 1980s and they all have electrical heating systems. In rental agreements with the housing company the electricity expenses are included in the rent as flat-rate and thus there are no financial incentives for the residents to pay attention to electricity consumption. Furthermore, the residents can't get any information about the household-specific consumption and consequently, they are not able to monitor and benchmark the consumption that is direct result of their own activities. These issues were identified as the first bottlenecks for involving residents in developing solutions for decreasing electricity consumption when planning the ULL. Various technical solutions were studied and commercial solutions providers were discussed with, so that more detailed data of the electricity consumption could be gathered and the consumption could be managed more efficiently (see the report by *Karlsson et al. 2016* for more details). A representative of the housing company participated in the meetings with providers of four different solutions. The solutions were presented and potential piloting was discussed. Additionally, the representative of the housing company was involved in discussions about several other solutions and plans related to energy-efficiency during the ULL. The decision on proceeding with a pilot case could not be taken at the company during the project but an offer of a distant temperature controlling system was asked during the last months of the ULL and a pilot project with the solution installed at the Innova house seemed promising. Based on the references of the system it can be estimated that the solution would generate savings of 20-30% in electric heating in typical houses. For the Innova house the savings potential was estimated to be around 15%, corresponding to approximately 15 000-20 000 kWh/year and to 3100- 4200 kg CO_2/year carbon dioxide emissions, using the average Finnish emission factor 209 kg CO_2/MWh for purchased electricity (Motiva CO_2-päästökertoimet). In case similar systems were installed to other, less energy-efficient buildings of the company, the savings for a building could be remarkably higher, even double the savings estimated above for the Innova house.

Apartment-specific electricity and water consumption meters were installed at the end of the year 2014 to three buildings operated by the housing company. The data were planned to be analysed so that the most significant sources of electricity consumption could be identified and development plans made accordingly. Household-specific consumption data and some examples of differences between similar households were also considered to be useful data in introducing the topic for the residents and for motivating co-development efforts as next steps. However, sufficiently detailed quality data for such analyses were not obtained during the ULL, due to numerous failures in measurements and troubles with the data collection. It can be assumed that based on detailed monitoring some obvious targets for significant improvements could be identified and potentially also e.g. failures of devices and water leakages could be detected more promptly. Environmental impacts of individual instances can be minor but if new practices or solutions would spread out to cover all 1161 apartments of the company in Riihimäki, the total impact could become remarkable.

Table 3 lists the rental apartment buildings in Peltosaari that the housing company operates: Altogether 16 buildings comprising of 494 apartments, corresponding to almost 30 000 m^2 of overall floor area. These figures illustrate the existing savings potential if more emphasis was put on improving the monitoring and management of the electricity use in the company.

Table 3 The rental apartment buildings in Peltosaari operated by the housing company.

Address	Built / modernized	Storeys	Nbr of apartments	Overall area of apartments	Inhabitants
Jupiterinkatu 4	1981 / 2001	4	31	1882 m^2	
Linnunradankatu 5-7	1989 / -	3	29	1891 m^2	
Linnunradankatu 9	1985 / -	6	20	1405 m^2	
Linnunradankatu 19	1989 / -	3	32	1593 m^2	
Linnunradankatu 21	1984 / -	6	38	2419 m^2	
Linnunradankatu 23	1993 / -	6	17 (all with saunas)	1060 m^2	
Linnunradankatu 25	1990 / -	3	16	870 m^2	
Linnunradankatu 27	1987 / -	6	27	1375 m^2	
Linnunradankatu 29	1990 / -	3	22	1004 m^2	
Marsinkatu 6	1980 / 2000	4	35	2059 m^2	
Merkuriuksenkatu 9	1983 / -	4	38	2145 m^2	
Otavankatu 4	1973 / 2005	4	30	1956 m^2	
Otavankatu 10	1986	3	39	2196 m^2	
Otavankatu 18	1979 / 1996	4	50	2828 m^2	
Saturnuksenkatu 2	1975 / 1999	4	37	2834 m^2	
Uranuksenkatu 1a	1979 / 2000	4	33	2354 m^2	
Altogether:			494	29 871 m^2	832

A draft of a guide leaflet for residents was generated and evaluated in the ULL. The leaflet provided basic instructions (a list of seven items) on how to regulate the temperature correctly in an apartment and how to ventilate without impeding the heating and ventilation system. The leaflet also presented the contact information in case of faults or need of guidance. The aim is that a representative of the housing company will go through the leaflet with all new residents signing a rental contract in the future. The leaflet will also be easily available in all apartments. The leaflet was not taken into use during the ULL and thus even short-term qualitative evaluation of its reception was not possible, not to speak of measurable impacts on electricity consumption. The maintenance personnel of the housing company has however reported that ventilation through windows for several hours seems to be common in the buildings and the heating elements are often left on during that time. It can be assumed that during the heating season the savings in heating electricity could be from 2% up to 10% if ventilation through windows could be reduced. Furthermore, the leaflet could also have an impact on general attitudes towards careless electricity consumption.

Supporting preparation of initiatives and innovations for improving environmental sustainability

Energy efficiency and co-development has clearly not been much highlighted in the operations of the rental housing company. Therefore one of the main efforts of the ULL turned out to be supporting identification of development targets and raising awareness of

potential solutions and methods to proceed in these fields. The activities of the ULL supported potential future initiatives of the company: analysis of electricity consumption data, technical solutions for decreasing electricity consumption and improved interaction with the residents. Even if the examples and suggestions of the ULL were not implemented, the discussions about the challenges, ideas and potential solutions have paved the way for future initiatives for decreasing energy consumption and thus the load on environment.

Decreasing electricity consumption seems to have become a more focal topic at the housing company during the ULL. The increased awareness among the personnel is one of the necessary steps to induce suggestions and innovations. Additionally the ULL introduced contacts to solution providers and opened the discussion with residents. Integrating expertise and viewpoints of various stakeholders can be valuable in future innovation processes.

Economic sustainability

The main goal of the ULL was to increase energy efficiency. Besides the impacts on environmental sustainability, well-planned improvements on energy efficiency also decrease costs. All the buildings of the rental housing company are heated with electricity and many buildings are in need of modernization. The living costs in the area should be kept on the current level, or preferably decreased.

The impacts of the ULL on the economic sustainability of the area cannot be reliably evaluated since there were no actual implementations. The potential impacts can however be discussed:

- Payback time of a distant temperature controlling system can be estimated based on the expected electricity savings and the investment cost. For a single building the payback time would be rather long but if acquired at the same time for several buildings, payback time of a few years could be expected.
- The direct impacts of the guide leaflet on electricity consumption bear several uncertainties. The greater economic impact might follow from the improved maintenance of the apartments and less need for support for residents from the maintenance personnel, as there are clear instructions and the responsibilities of the residents are well-defined in the guide leaflet.
- Economic impacts of engaging residents in developing and piloting solutions are challenging to quantify. The benefits usually follow from "avoided costs", such as: early identification of non-working solutions (and thus decision not to invest) or potential bottlenecks, improved acceptance of a new solution among the users, and faster start-up and active use of a solution.

5.2.4 Evaluation of fulfilment of the Urban Living Lab definition

Due to the delays and obstacles during the ULL 'Energetic co-operation' the true living lab activities hardly even started. The goal was to co-develop and pilot solutions for energy efficiency with the representatives of the city, companies and residents, but the focus changed during the ULL to raising awareness and processing solutions and examples with the housing company. The ULL lacked the elements of development and evaluation in a real use context and integration of the relevant stakeholders in the co-development.

The main involved stakeholders in the ULL were the project team members (Riihimäki and VTT), representatives of the housing company Kotikulma (maintenance foreman, CEO, house manager), representatives of providers of technological solutions and residents. The represented groups fulfil well the goals of the ULL but it was not possible to involve the stakeholders into progressive co-development. Instead, the ULL comprised of numerous separate meetings with few stakeholders present.

The ULL attained well the aim of learning and exchanging knowledge, as has been described in the previous paragraphs. It also provided significant insights for the researchers of the project as will be discussed in the chapter Lessons learned and conclusions.

5.2.5 Continuation

The ULL 'Energetic co-operation' provided the housing company with several suggestions on development activities towards decreasing electricity consumption and increasing co-operation with residents and solution providers in the field. Investment on the distant temperature controlling system is currently under consideration in the company but the final decision has not yet been made.

The more detailed metering of the electricity consumption in the buildings will expand to other buildings of the company as well. Efficient use of the gathered data (monitoring, analysis, communication, (co-)development of improvements) should however also be carefully planned and resources for that should be allocated, in order to benefit from the improved metering.

Guide leaflets and introductory discussions with new residents have been decided to be taken into use at the housing company. However, there are currently very little resources at the company for development initiatives. Thus, the progress is slow even when the decision has been made. Furthermore, other studies on electricity saving and behaviour change indicate that engaging and motivating people for actions is generally challenging: the monetary savings are often considered quite small and changes to routines would usually be needed. Use of electricity is seldom paid attention to but instead, electricity is an invisible means that helps in carrying out everyday chores. Reducing consumption is often perceived as compromising comfort. Thus, well-planned strategies should be made whenever the savings are aimed at through behaviour change. On the other hand, for such initiatives the living lab-approach with rapid experiments and evaluation of solutions together with the end-users is highly recommendable.

The greatest impact of the ULL has most likely been on influencing attitudes and increasing awareness of the employees of the housing company. Through the suggestions and examples of the ULL the readiness level for working more actively for improving energy efficiency has probably increased and the topic is more prioritized in the company. That will hopefully lead to new ideas and a faster progress to implementations in future.

5.2.6 Lessons learned and conclusions

The ULL 'Energetic co-operation' turned out to be challenging despite that the plans in the beginning seemed feasible and promising, and it had potential for clear measurable impacts. Retrospectively it can be clearly seen that its implementation was too much in hands of a company that had not been involved in the project from the early phases. The company could not commit the needed resources to the work and the representatives were not familiar enough with the approach.

The need to shift the focus of the ULL and to redefine it should have been discovered earlier. In that case the aims, methods, target groups and activities could have been adjusted and the evaluation of impacts could also have been planned accordingly. Impact on attitudes and learning are challenging to evaluate but nevertheless, if that had been defined clearly as a goal, several people from the housing company would have been early involved in the ULL and for example interviews for evaluating the impacts would have been possible.

Many of the challenges that became evident in this ULL were also faced in the other ULLs but less decisively. It can therefore be concluded that the lessons learnt in this ULL are fundamental. It is advisable to define milestones for the ULL and to return to the checklist

defined in the planning phase (see *Friedrich et al. 2013*) in that context to ensure that the original plans and assumptions are still valid, and to make adjustments if necessary. Reaching the key stakeholders and ensuring their commitment to the goals and working methods of the ULL are crucial. This also relates to the decision making and implementation: there's a risk for disappointment and frustration if the suggestions of the participants can't be taken into account in the decision making phase.

5.3 Evaluation of Urban Living Lab 2 in Peltosaari

5.3.1 Summary of the Urban Living Lab

The Urban Living Lab 'Sustainable decisions' was implemented between April 2014 and September 2015. It focused on developing ways to incorporate more clearly the city's climate and energy commitments and targets as well as future regulations into decision making of the municipality. Two workshops bringing together decision makers and city representatives, and activating dialogue and co-development around the topics were arranged. Ideas for improving practices in preparing and supporting decision making within the municipality were gathered. The workshops were arranged in August 2014 and September 2015. The ULL also provided some examples and calculations of alternative solutions in the building projects and encouraged discussions about renewable energy solutions and impact assessments.

The goal of the ULL was to enhance communication between the city councilmen and the municipal officials and to support decisions on energy efficient and sustainable investments. One important part of this ULL was to provide a channel for mutual learning and interaction between the stakeholders so that the preparations and decision making will be efficiently aligned according to future needs and there will be enough information about alternative solutions in an early stage of a development project.

The sustainability objectives relevant for the Peltosaari ULL 'Sustainable decisions' are:

- To support decision making on energy efficient and sustainable investments
- To develop and experiment with new practices in the municipality to enhance collaboration and communication
- To advance environmental sustainability in the city through the means above

The ULL 'Sustainable decisions' was implemented mainly by City of Riihimäki (including the city council) and VTT. Other important stakeholders in the ULL were the external experts and suppliers providing information of the alternative solutions, and representatives from other municipalities and governmental agencies.

For more detailed information on the selection and implementation of ULL 'Sustainable decisions', see reports *Selection of Urban Living Labs in Alby and Peltosaari* (Karlsson et al., 2015) and *Establishment and implementation of Urban Living Labs in Alby and Peltosaari* (Karlsson et al., 2016) (available at www.suburbanlab.eu).

5.3.2 Evaluation methods

The focus of the ULL was on enhancing collaboration and learning and through that to influence on long-term development in the city, mostly related to environmental sustainability. Data from the following sources have been used in the evaluation:

- Discussions in the workshops and meetings
- Feedback surveys and questionnaires before and after the workshops
- Meeting minutes and emails related to the ULL
- Observations and assessments of changes in practices within the municipality

The main method for evaluating the fulfilment of general ULL principles has been an analysis of the documentation of the ULL and review of the process with regard to the principles.

5.3.3 Evaluation of the Urban Living Lab's contribution to sustainability

The evaluation of the ULL's contribution to sustainability is divided according to the three dimensions of sustainability: environmental, social and economic sustainability. The main focus of the ULL 'Sustainable decisions' was on environmental sustainability. Potential

contributions to social and economic sustainability are however briefly discussed since all the three dimensions are interlinked and hence the division between them is often somewhat artificial. The main emphasis of the ULL was on learning, raising awareness and enhancing interaction: Progress on these fields within this timeframe needs to be assessed qualitatively and for the most part through indirect measures.

Social sustainability

Social sustainability was not in the focus of the ULL 'Sustainable decisions'. The ULL can however be argued to have had also some indirect impacts on social sustainability: Supporting learning and increase of human capital has often more widespread impacts than just on the main topic in focus (environmental sustainability, in this case).

The ULL has also promoted Peltosaari and the development activities there among the municipality representatives. This can potentially have an impact on attitudes towards Peltosaari that has often been regarded as an unattractive and restless area where the decision makers have been reluctant to invest in. Improvements in the image of the area may influence on availability of equal opportunities for Peltosaari residents.

Environmental sustainability

For evaluating the impact of the workshops the number of people reached through them is considered. Figure 3 Number of participants in the workshops of the ULL presents the number of participants and the division between councilmen and officials that participated in the workshops. The workshop in August 2014 started already at 12:00 which made the participation difficult for many of the councilmen taking part in working life. The workshop in September 2015 started at 16:30 which obviously reduced the participation rate of the officials. Here the participation of 15 out of 43 councilmen can be regarded as a good result (workshop in September 2015). Besides the persons who actually participated in the workshops, the invitations and the presentation materials were distributed to all invited persons and thus the workshops have reached a much wider group of people than just the participants.

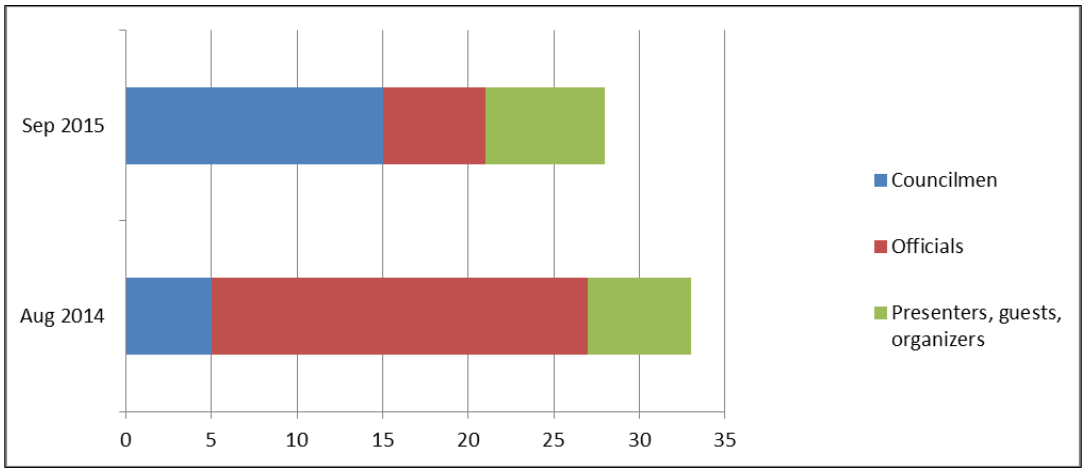


Figure 3 Number of participants in the workshops of the ULL

Before the first workshop a questionnaire was conducted for the invited people to probe for how familiar the planned topics of the workshop were to them. Here 33 responses were received. Figure 4 presents the responses on how well the respondents knew the agreements and targets and Figure 5 presents the responses on how these agreements and targets affected the decision making in the city. More than half of the respondents felt that they knew the agreements and targets at least quite well.

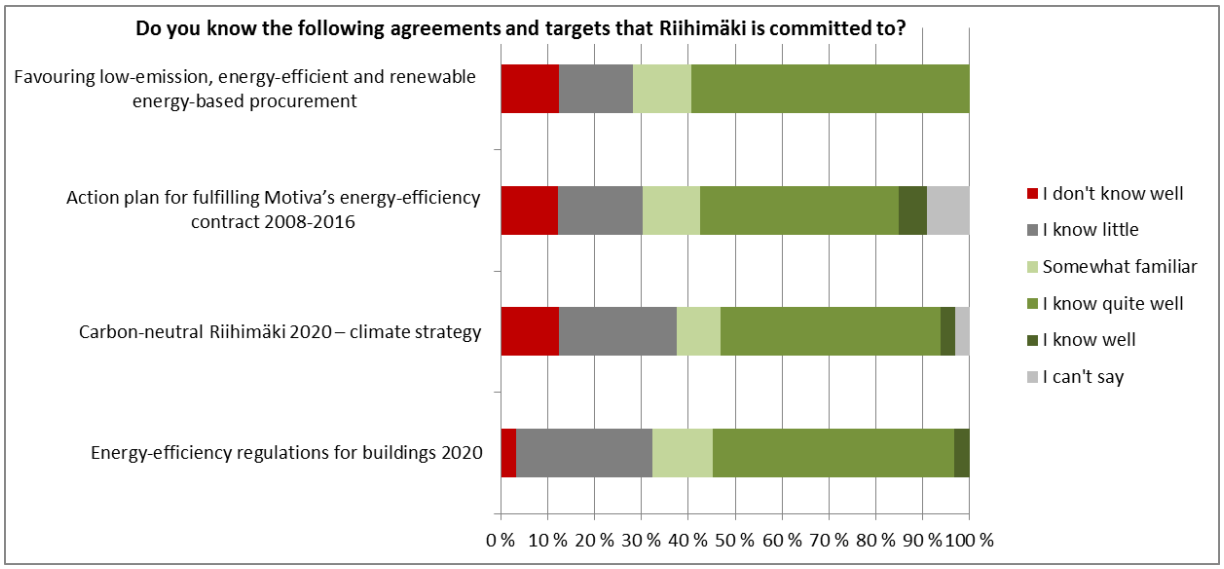


Figure 4 Responses to the pre-questionnaire about the knowledge of agreements and targets of the city.

The Carbon-neutral Riihimäki 2020 -target was regarded to have affected most the decision making in the city: almost 50% stated that it had affected very much or occasionally the decision making. It is however noteworthy that 24-34% of the respondents felt that the four targets had affected the decision making in the city very little or not at all.

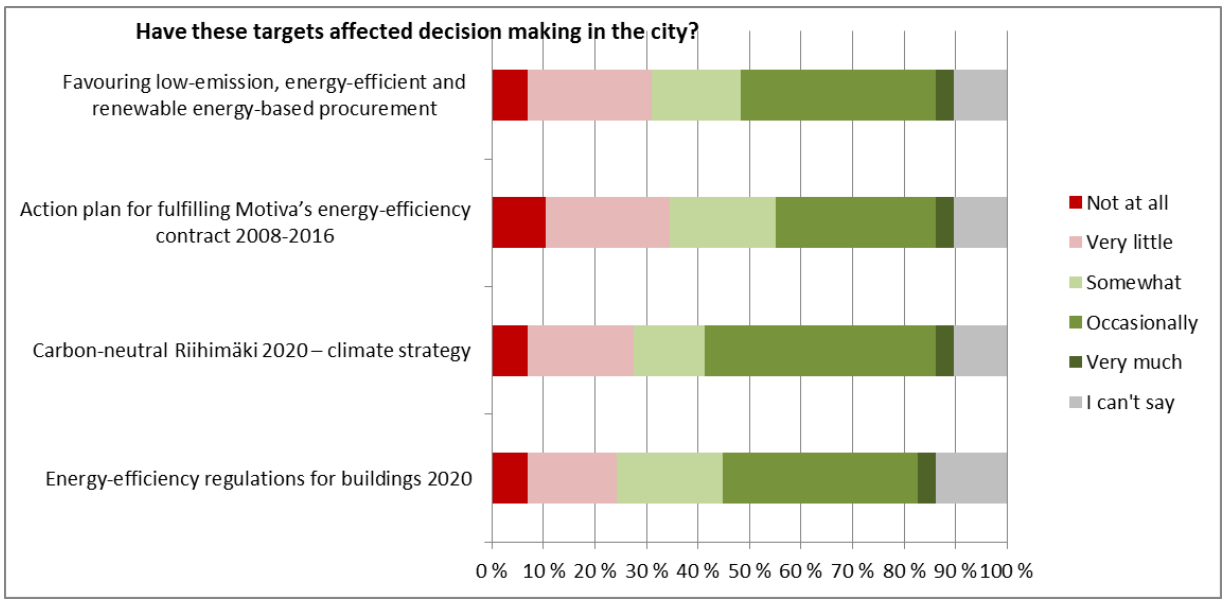


Figure 5 Responses to the pre-questionnaire about how the agreements and targets of the city affect decision making.

Feedback was gathered with questionnaires after both workshops. 22 responses to the feedback questionnaire were received after the first workshop, and 10 responses after the second workshop. The questions of the feedback questionnaires were not identical, but some similarities can be seen between the feedbacks: The workshops were considered useful and worthwhile participating (90-100% agreement with the statements useful and worthwhile to participate). Discussions in the workshops were highly valued. In the second workshop there was less time for discussions between the participants and this is reflected in the feedback.

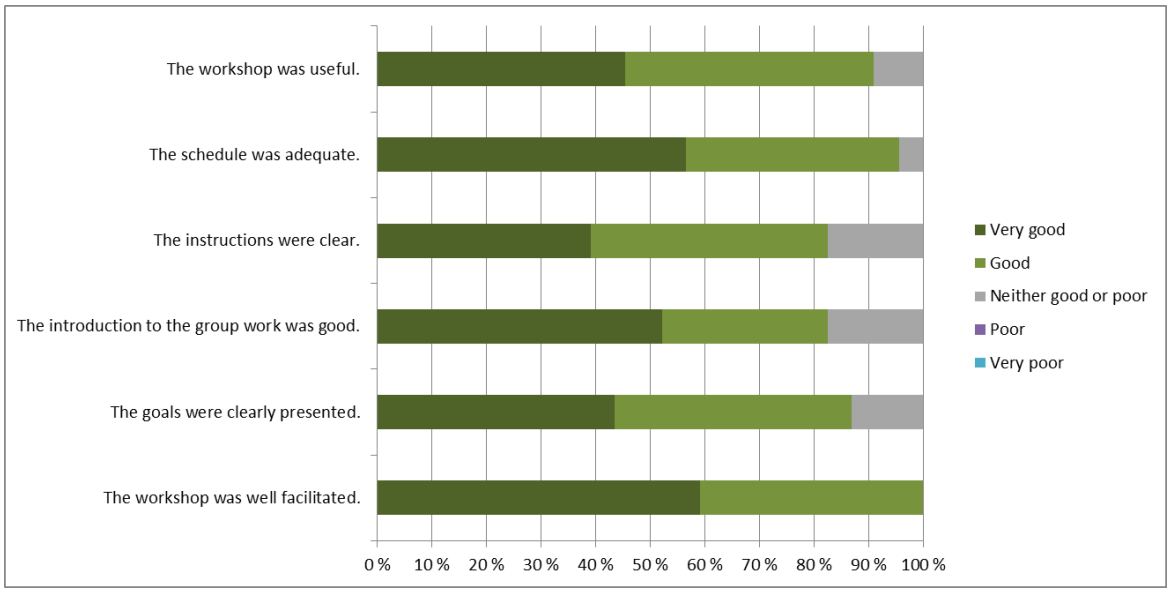


Figure 6 Feedback from the first workshop (Aug 2014)

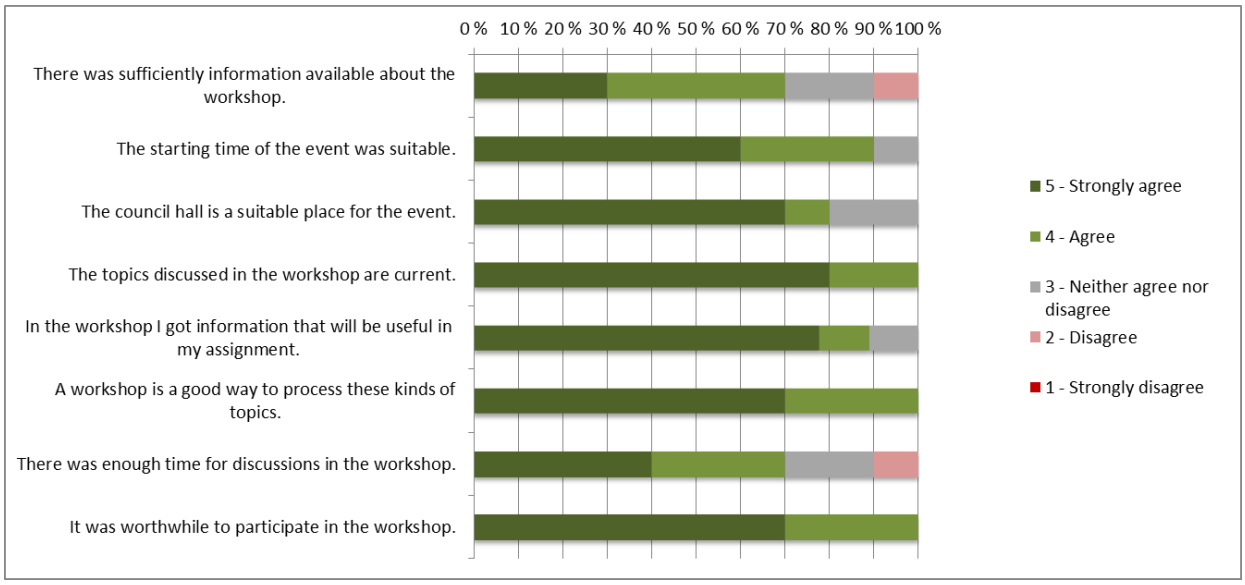


Figure 7 Feedback from the second workshop (Sep 2015).

The open comments in the feedback stressed the importance to interaction.

"It is really a pity that only few councilmen participated. There should be more events like this during the daytime when the participants are not tired. Interaction is important – reading documents on paper or online alone is not as efficient as this kind of workshop." (Feedback from a participant in the workshop 25.8.2014, translation by the authors)

It was also remarked in the open comments of the questionnaires and in oral feedback that there were few representatives from the council in the first workshop and few officials in the second workshop. This can be seen to reflect the fact that the participants value the opportunity to meet and discuss with the representatives from the other groups.

After the workshops the representatives of the city of Riihimäki reported some potential implications of the workshops and the ULL:

- Life-cycle projects are considered for some upcoming investments
- PV panels will be included in some future building alternatives

- Collaboration and flow of information between city planning and energy department of the city has been increased.

At the end of the ULL an online questionnaire was sent to all councilmen and the relevant officials for evaluating impacts of the workshops and for gathering still some suggestions for enhancing the dialogue to support preparation and decision making in the city. The goal was to reach also those who didn't participate in the workshops. Only nine responses were received: from two officials and seven councilmen. Three of the respondents had participated in both the workshops, two respondents in one workshop and four respondents had not participated in either of the workshops. The reasons for not participating in the workshops were: "*The time was not suitable*.", *"I received the information too late*", and "*I receive sufficiently information from other sources*.".

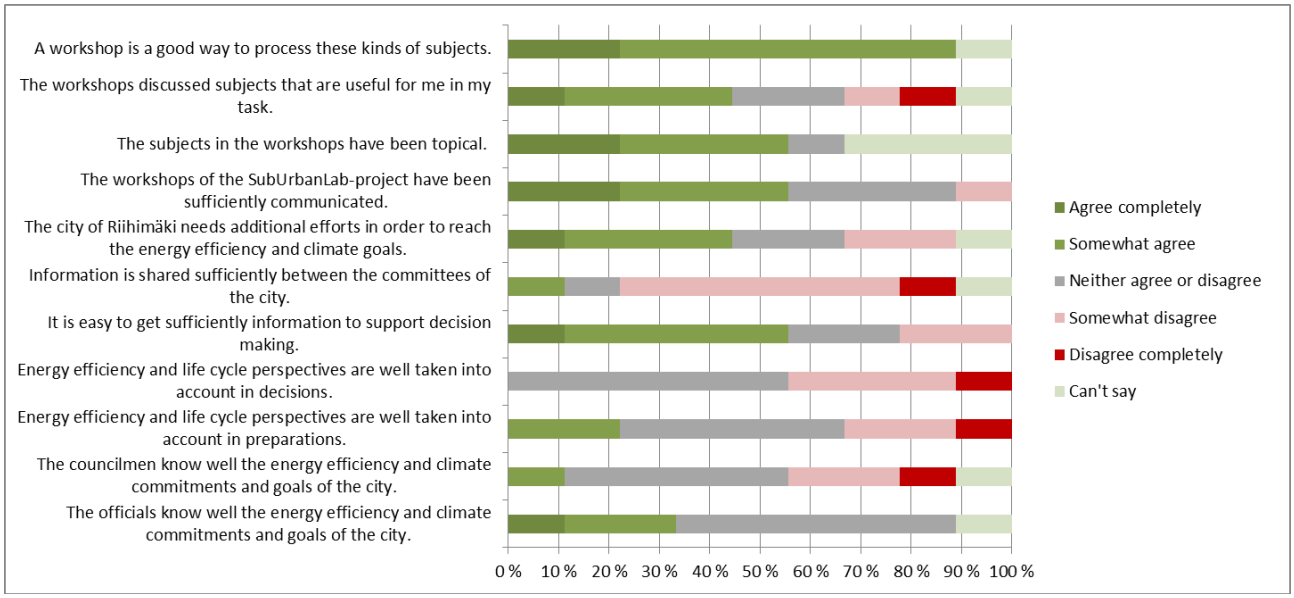


Figure 8 Responses to the statements in the questionnaire sent to all councilmen and relevant officials.

The responses clearly highlight two points: Firstly, the workshops were regarded as a good way to enhance interaction and communication. Secondly, the energy efficiency and life cycle perspectives are not well integrated into decision making in the municipality, despite the goals and commitments of the city. These further emphasise the need for developing ways to take them better into account in the future.

Although only a small number of responses were gained and the results thus need to be interpreted with cautiousness, it is alerting that a clear majority of the respondents felt that information is not sufficiently shared between the committees of the city.

Interestingly, none of the respondents of the final questionnaire thought that energy efficiency and life cycle perspectives are well taken into account in decisions, whereas in the pre-questionnaire almost half of the respondents stated that the listed targets have affected decision making in the city. Similarly, in the pre-questionnaire 48-59% of the respondents stated that they know at least quite well the city's targets and commitments but in the final questionnaire only 11% of the respondents agreed completely or somewhat with the statement: "*The councilmen know well the energy efficiency and climate commitments and goals of the city*." 33% of the respondents in the final questionnaire agreed completely or somewhat with the statement: "*The officials know well the energy efficiency and climate commitments and goals of the city.*" The question in the pre-questionnaire related to assessing own knowledge of the topics whereas the question in the final questionnaire was more

general, referring to knowledge of the councilmen and officials as groups. This may partly explain the differences in the responses.

Based on the feedback and the ideas from the workshops it seemed necessary to develop ways to support continuously the interaction between the groups and to launch activities to support achieving the sustainability targets of the city of Riihimäki. In the final questionnaire the respondents' views on these suggestions were asked. The respondents could select a predefined suggestion or to suggest other means. The responses are presented in Table 4.

Table 4 The most preferred ways to support achieving the sustainability targets and commitments of the city (final questionnaire)

To achieve the sustainability targets and commitments of the city, the following actions are needed	
Briefings through emails and newsletters.	5 / 9
1-2 workshops/year where energy efficient solutions and examples from other cities are presented.	5 / 9
Enhanced collaboration between the officials and the councilmen.	5 / 9
Development of the working ways of the committees.	2 / 9
Current actions are sufficient.	1 / 9

As ways to enhance collaboration between the officials and the councilmen the respondents suggested workshops, seminars and tailored trainings.

Additionally, the respondents of the final questionnaire and the questionnaire in September 2015 were asked to suggest ways to enhance the flow of information and collaboration within the municipality in the planning and preparation phase for the decisions (see Textbox 4).

Comments on ways to enhance the flow of information and collaboration within the municipality
"These kinds of briefings." *"E.g. efficient steering groups are needed"* *"There should be a common channel for communication."* *"The projects and preparations should be introduced better than today to the decision makers before the time of decision making. Project presentations are important and in some projects they have already become established practice. It should also be considered how and at what stage, if possible, preliminary and intermediate briefings about a project could be arranged. It is important to hear expert speakers and reporting officials; that should be enabled in the committee meetings."* *"Email is a well working channel for communication."* *"Background information should be made available well in advance of the decision making."* *"Discussion events"* *"The chairmen of the political groups and the officials will have a mutual meeting [in the preparation phase. Then the chairmen of the political groups will inform about the topic in their own organisations."* *"The city's website should present more information about sustainable development"*

Textbox 4 Suggestions of ways to enhance the flow of information and collaboration. Translation by authors.

Overall, the suggestions and viewpoints presented in the questionnaires and heard in the discussions during the ULL clearly indicate that there is a need to enhance interaction between the council, committees, departments and other organisational groups of the city. Integration of the city's energy efficiency and climate commitments and targets in the decision making also requires further efforts. It is not possible to assess whether the knowledge of workshop participants has increased as a result of the ULL, and if the ULL has had an impact on the decisions. Thus the potential contribution to environmental sustainability needs to be discussed based on the responses of the involved people. The goals of the ULL were regarded as relevant and necessary, and the implemented actions received positive feedback. The number of participants in both workshops was satisfactory, although it seems challenging to find a suitable time for both officials and councilmen. Suggestions for enhancing interaction from both those who participated and those who didn't participate were in line with the plans of the ULL. Thus workshops and discussion events supported with active communication through e.g. email seem the most feasible ways to support decision making, to share information and to encourage discussion. Experiences from the ULL were however not encouraging with respect to online channels for communication. The workshop invitations were sent by email 2-3 months before the event and reminders 2-3 weeks before the event. Nevertheless, the invitation didn't reach some people in time or at all. Similarly, the online site was set up to enable discussion before, during and after the second workshop, and also those who couldn't participate in the workshop were invited to ask questions and to send suggestions. No inputs were gained through that channel.

The results indicate that in order to better align the decisions and preparations in the municipality with the environmental sustainability targets, new ways of working and improved collaboration are needed. Raising awareness and discussing novel solutions and their implications among the key stakeholders may affect future decisions on city's investments and strategies, and thus have far-reaching impacts on environmental sustainability.

Economic sustainability

The ULL 'Sustainable decisions' may potentially affect economic sustainability if new procedures and practices will be implemented in the city. The ULL may contribute to improved efficiency and coherence in operations of the city, as a result of improved collaboration and knowledge sharing and more efficient decision making. Involvement of various relevant groups into preparation, briefing decision makers beforehand about alternatives and their impacts and developing new ways to estimate cost effects can play an important role in the long-term sustainable development of the city.

5.3.4 Evaluation of fulfilment of the Urban Living Lab definition

The ULL 'Sustainable decisions' originated from a need observed internally in the organisation of the city of Riihimäki. In the informal discussions between the officials and the councilmen it had been noted that both sides become occasionally frustrated with the processes of preparation and decision making. The energy efficiency and climate targets and commitments of the city define certain courses for plans and investments of the city but it has been difficult to progress in compliance with those. The ULL was mainly planned among the ULL team but the idea was presented to a few key persons in the organisation and it was informally discussed in several occasions with numerous representatives of the organisation. Since the goal was to trial with potentially permanent practices to bring together the councilmen and the officials it was noted that it is not realistic to arrange several events during a year.

During the workshops the participants were on one hand engaged into discussions about the workshop topics (e.g. energy efficiency and life cycle projects) but on the other hand their

inputs were asked for improving collaboration and ways to promote environmental sustainability within the organisation. Invited guest speakers in the workshops represented other municipalities, research organisations and companies. They participated in the group work and discussions as well. At the end of the project a questionnaire was still sent out to all councilmen and relevant officials in order to gather views also from those who had not participated in the workshops. The number of responses received was however only nine. Other means aiming to involve people not present in the workshops were not successful: No comments or questions were posted to the online platform that was available for the stakeholders for discussions about the topics of the second workshop. It can be assumed that the people who are also otherwise interested in the topics of the workshops participate, and those who are not, don't participate in the workshops or discussions, regardless of the channel and time.

The principles of *Integration of researchers, public organisations and companies to co-develop new solutions* and *Users as active partners in the development during the whole process* have thus been satisfactorily complied with in the ULL, within the boundaries of feasibility. The ULL had to balance between the aims of active and extensive participation of stakeholders and the very limited time that the stakeholders were able and willing to devote for the activities.

The workshops focused on the topics that are, or should be, remarkable in the daily work of the stakeholders. The events took place in the town hall where also majority of the meetings with the councilmen are arranged. The activities related to the ULL were therefore a natural addition to the traditional activities of the stakeholders. It is even possible that some of the participants were not aware of the experimental dimension of the ULL. Encouragement to participate actively in the development and the requests for ideas and suggestions were the main elements in the workshops that distinguished the ULL from conventional events. It can be concluded that *the solution has been developed and evaluated in the real use context*.

The main objective of the ULL was to support co-learning, to enhance collaboration and to improve exchange of knowledge. It is challenging to evaluate to what extent this objective has been fulfilled. The fact that altogether 61 persons participated in the workshops and the great majority of the participants regarded the events as useful indicates that *learning and exchange of knowledge among the partners* occurred. Through the new practices and cross-department collaboration that were introduced as a result of the ULL the support for learning and sharing of knowledge extended also to other situations than merely the activities managed directly by the ULL.

Similarly to the evaluation of learning it is challenging to evaluate if the various involved people have experienced the activities *encouraging and rewarding*. Here also the positive feedback on the workshops provides the best argument for the fulfilment of the principle. Similar events were hoped to be arranged in the future and it was regretted that not several people had come to the workshops. During the workshops the discussions were also lively and many people continued the discussions at the venue after the workshop had ended.

5.3.5 Continuation

The activities planned, implemented and evaluated in the ULL 'Sustainable decisions' can well be continued as a permanent practice within the organization. Continuation of workshops, discussion events and briefings supporting preparation and decision making on city's projects was supported in the feedback. Arranging such events is not costly but it requires a responsible official to be named, clear aims to be defined for the next years and some working time needs to be allocated for the task. Decision on continuing the activity and allocation of resources for it has not yet been made in the municipality.

5.3.6 Lessons learned and conclusions

The ULL 'Sustainable decisions' focused on a relevant topic for development that had been identified in the municipality: Environmental sustainability is emphasised in the values and programmes of the city but it is not yet sufficiently integrated into the operations of the city. In order to align the efforts and decisions more efficiently in accordance with the energy efficiency and environmental sustainability commitments and targets of the city, new ways of working and improvements in knowledge sharing and collaboration are needed. The workshops, examples of alternative solutions that were used for activating discussions and new ideas, and efforts for increasing co-operation and knowledge sharing between organisational units of the city were positively regarded in the organisation and continuation of similar activities were supported.

The potential short-term impacts of the ULL are learning, enhanced collaboration and introduction of new practices, raising awareness and trying to influence mindsets, in other words – areas that are challenging to evaluate and there is no explicit linkage from them to the overall goal of improving environmental sustainability. However, there don't exist many acceptable ways to influence on decision making in the city. Furthermore, if successful, the impacts of such efforts can be truly remarkably in long term.

The efforts of the ULL could have been further supported by more effectual communication activities. It turned out that the established communication channels were not sufficient and it would probably have been beneficial to make a tailored communication strategy for the ULL and to consider also other approaches than just using the existing ones. The email distribution lists of the city worked for sending workshop invitations and questionnaires (although that was somewhat inflexible and inefficient even for that purpose) but that didn't encourage dialogue and collaboration outside of the workshops.

On the other hand, it is recommendable to carry out trials with other alternatives in parallel with the traditional solutions since there's a great risk that new channels or solutions don't reach the target group at all. The dialogue forum –website, introduced in the context of the second workshop of the ULL to encourage further discussion and to allow participation regardless of time and place, was not used at all by the target group. The results of using online methods for engaging people into participatory activities have not in general been promising in this project. Innovations for that field are needed – the interaction with co-development partners should become more frequent, effortless and flexible to allow rapid experiments and equal opportunities to influence for various relevant stakeholders. It can't be reached by using face-to-face methods only.

It needs to be acknowledged, however, that some participants may also prefer the traditional ways of working. The most commonly suggested ways to improve collaboration in the ULL were face-to-face events and meetings. The ULL also set forth the challenges of busy schedules and many competing engagements of the target groups. This highlights the perspective of being considerate of participants' time and to involve them only when required and to be realistic about what is possible. Some of the responses in feedback questionnaires of the ULL brought out positive attitudes even towards hierarchical structures and the role of being a passive receiver of information. This could potentially indicate trust in the organization: The organization easily becomes inefficient if too large groups are involved in preparation and knowledge is shared extensively. Clear roles and appreciation of expertise of co-workers can be regarded as prerequisites for a well-working organization and therefore wider involvement and collaboration are not considered necessary.

5.4 Evaluation of Urban Living Lab 3 in Peltosaari

5.4.1 Summary of the Urban Living Lab

The Urban Living Lab 'Together more' was implemented between March 2014 and November 2015. It focused on arranging opportunities for low-cost leisure activities in the area and on creating easy possibilities for the inhabitants of Peltosaari to participate in the development of their living environment. The underlying goals were to decrease segregation and to increase communal feeling, to enhance dialogue between the municipality and residents and to support crossing the boundaries between the various identified groupings in the area.

The ULL comprised of three concurrent areas for development: 1) arranging places for activities and meetings (both indoors and outdoors), 2) piloting activities and events and supporting other actors' undertakings, and 3) increasing communication between the residents, municipalities and organizations. The work comprised of identifying opportunities, sharing information and contacts, bringing together relevant stakeholders and supporting the launch of activities. The inhabitants were engaged through interviews, questionnaires, discussion events and field tests. The collaboration with the associations and projects related to the objectives of the ULL was mainly built in meetings and events but also through informal encounters in the area.

The sustainability objectives relevant for the Peltosaari ULL 'Together more' are:

- To enhance wellbeing of the people living in Peltosaari and the image of the area
- To increase communal feeling and counteract segregation
- To support participation, learning and self-fulfilment among the residents

The ULL 'Together more' was implemented in collaboration between City of Riihimäki, VTT, Peltosaari Association, residents, Resident association of Kotikulma Oy, Peltosaari Parliament and other projects influencing activities and appearance of the area (LiiKuTa, Kulttuuriviritys, Caretaker of Vantaa River, Youth first). The ULL functioned mainly as a coordinator and facilitator for the activities organized in collaboration with other organizations.

For more detailed information on the selection and implementation of ULL 'Together more', see reports *Selection of Urban Living Labs in Alby and Peltosaari* (Karlsson et al., 2015) and *Establishment and implementation of Urban Living Labs in Alby and Peltosaari* (Karlsson et al., 2016) (available at www.suburbanlab.eu).

5.4.2 Evaluation methods

The actual overall contribution of the ULL on residents' perceptions, wellbeing and image of the area is difficult, if not impossible, to assess reliably within the timeframe of the ULL: The attitudes and practices change slowly and are affected by numerous other factors than just the ones within the range of the ULL. The evaluation is mainly founded on clear attributes that are hoped to contribute to wellbeing and image in the long run, such as the number of activities and how they were received, the number of people involved in the activities and the activeness in communication. Additionally, data that may reflect changes in the image of the area and views of the residents have been assessed. Both qualitative and quantitative methods have been used. Data for evaluation comprises of:

- Resident questionnaires in May 2014 and November 2015
- Data of the events and activities relating to the ULL
- Activity and followers through social media channels
- Use of the Living room

- Meetings & discussions with actors contributing to leisure activities in Peltosaari area
- Meetings & discussions with residents (events, emails, phone calls, meetings, incidental encounters)
- News articles about Peltosaari and SUL-related activities

The questionnaire data were gathered mainly by recruiting respondents and handing out printed questionnaire forms in two events in Peltosaari: The first questionnaire was promoted during the opening of the market season in May 2014 and the second during the Restaurant day in November 2015. The questionnaires were not identical but had partly same questions. A satisfactory number of responses was received: 88 responses in 2014 and 64 in 2015. The share of female and elderly respondents was large in both questionnaire data (see Figure 9). In the second questionnaire 67% of the respondents were above 54 years-old.

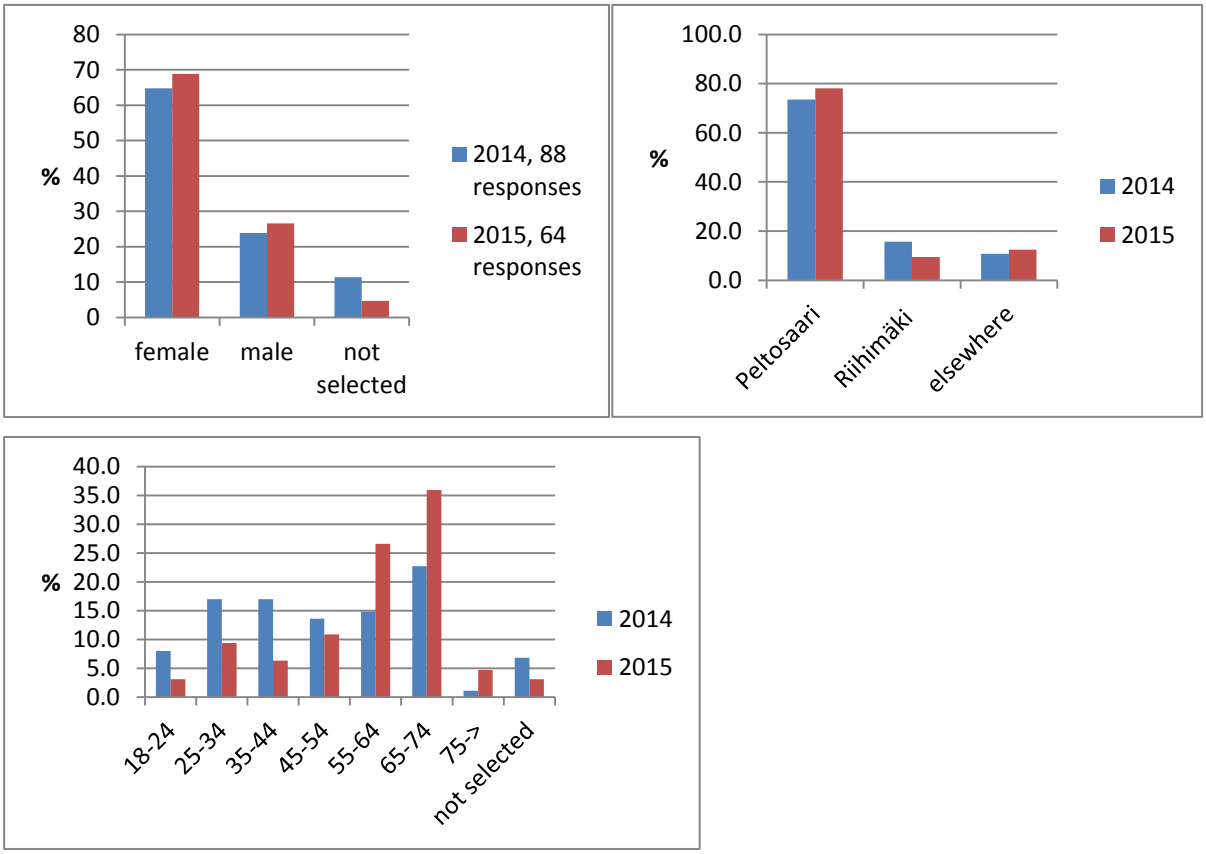


Figure 9. Background information about the respondents of the questionnaires in 2014 and 2015.

The results of the questionnaires relevant for the evaluation are presented in the following chapters.

Fulfilment of general ULL principles has been evaluated by analysing the documentation of the ULL and review of the processes within it.

5.4.3 Evaluation of the Urban Living Lab's contribution to sustainability

The evaluation of the ULL's contribution to sustainability is divided according to the three dimensions of sustainability: environmental, social and economic sustainability. The focus of the ULL 'Together more' was in practice fully on social sustainability. Potential contributions to environmental and economic sustainability are however briefly discussed since the three dimensions are interlinked and contributions on social sustainability may simultaneously influence on environmental and economic sustainability.

Social sustainability

Meeting places for the residents

The goal of the ULL was to offer meeting places and promote their use in the area, in order to support bringing together residents of various groupings, representatives of city and its projects and potential external partners who could arrange activities in the area. In an earlier project the possible construction of a new village house was planned and originally the ULL involved stakeholders into discussions about the village house and plans concerning it. It turned out however that the construction of the village house was unsure and anyway not possible to be realized within next five years. Therefore the emphasis was put on exploring opportunities to utilise existing spaces in central locations in the area. Offering premises used by the associations in the area, Recycling Centre of Peltosaari Association and Tellustupa of residents' association, for the use of other purposes and by other actors was also negotiated. During the ULL new events or activities were introduced at the Recycling Centre: senior gymnastics, restaurant day and a service point of public healthcare.

A rental agreement of a suitable space for "Peltosaari Living Room" by the main walkway of Peltosaari was made in early 2015. The opening ceremony of the renovated space was in March 2015. The events and activities since organized in the "Living Room" include:

- Multicultural café once a week
- Meetings of the Peltosaari Parliament
- Theatre club for children twice a week during the summer
- Office and reception of an employee of the city 1-2 days/week (the project manager of Peltosaari-project, a social worker and a social integration coordinator for immigrants)

The space is also available free of charge for residents, clubs and associations that organize activities in Peltosaari. For example Estonian and Russian clubs have their meetings once a week or fortnight in the "Living Room" and a reading club arranges its monthly meetings there. The number of visitors in the "Living Room" during a year is roughly estimated to be around 1000.

In October 2015 a cultural project of the city, "Kulttuuriviritys", started its activities in a spacious room, so called "Taideärrä" that was rented in the same building as the "Living Room". As a consequence, there have since been a lot of activities in Peltosaari targeted especially for the children and youth. Availability of the new larger space decreased somewhat the demand of "Living Room".

Peltosaari is sparsely built and the residents value the area for its closeness to nature. Therefore also activities and meeting places outdoors were considered relevant. The park area around the pond in Peltosaari, Bad Segeberg, was tidied in the ULL to be more attractive and suitable for spending time and arranging events. In addition to the events organised by the ULL (presented in the next paragraph), based on casual observations the residents seem have started to spend more time near the pond.

Collaboration with a the "River janitor" –project, focusing on increasing recreational use of Vantaa river, resulted in building a fishing place to the pond in Peltosaari in May 2015. A

fishing event was arranged at the fishing place in October 2015 together with a local fishing association. Approximately 25 persons participated in the event. The local school has also planned to bring pupils to the place to learn to use fishing equipment and to learn to handle and recognize fish.

The contribution of these meeting places on the residents' wellbeing and appreciation of the area is closely intertwined with the activities and encounters that take place. Therefore the evaluation results in the next paragraph probably reflect also significance of the meeting places but it is impossible to distinguish from other factors. Renovated spaces in active use, instead of abandoned dilapidated premises along the main walkway, and tended park area can also be assumed to have a positive impact on the general impression of the area, and thus its appreciation.

Activities for the residents

The ULL 'Together more' aimed to organize low-cost events and activities for the residents in Peltosaari. The goal was to enhance the quality of life and to provide opportunities to create social contacts, and thereby to increase communal feeling, appreciation of the area and decrease segregation. The most important activities organized by the ULL are described in more detail in the report *Establishment and implementation of Urban Living Labs in Alby and Peltosaari* (Karlsson et al., 2016) (available at www.suburbanlab.eu).
The ULL had different roles in activities that were planned and implemented: Some events and activities were as far as completely organized by the ULL but in most events and activities the ULL participated as a co-producer/organizer, together with other projects, associations or organisations in the area. Some activities were only initially nurtured by the ULL, for example by bringing together relevant contact persons or by promoting Peltosaari area as a location for the activities. The ULL actively sought for co-operation with other organisations, groups and projects to support continuity and to be able to establish more with scarce resources.

Table 5 presents a list of the events and activities in which the ULL has contributed, classified according to the role of the ULL in the activity. The table also shows an estimate of the number of participants in each event or activity and the groups that participated. Exact turnouts for the events don't exist because pre-registration was not required in any of them, participant lists were not circulated and in many of the events people were welcomed to join in at any time and come and go according to their own schedules.

The ULL was as a producer or co-producer in altogether fourteen events within 17 months. Roughly 1100 people altogether can be estimated to have participated in these events. The same people participated in many of the events on the list and a small group of active residents has participated in almost all events. However, some of the arranged events attracted also new participants and the turnout was surprisingly high. It can thus be estimated that the activities in the ULL 'Together more' influenced overall 400-600 individual persons.

Table 5. The events and activities relating to the ULL in Peltosaari

Role of ULL	**Activity** **Time**	**Organizer(s)**	**Participants involved**	**Estimated number of participants**
Producer	Resident discussion event Nov 2014	ULL	Elderly residents, Personnel of the city	75
	Opening of the Living room Mar 2015	ULL	Residents, Personnel of the city	60
	Cleaning day twice a year	ULL (Peltosaari project)	Residents, associations	20-50
Co-producer	Urban gardening May-Aug 2014	ULL, LiiKuTa-project, Peltosaari Parliament	School children and their parents, Teachers, Personnel of the city	40
	Opening of Christmas street and Christmas porridge Dec 2014 and 2015	Peltosaari Association, ULL, occasionally other co-operation partners	Residents, passers-by representing all age groups	200
	Winter event (Shrovetide) Feb 2015	Peltosaari Associaton, ULL	Residents, passers-by representing all age groups	200
	Midsummer festival June 2015	ULL, Peltosaari Association	Residents, also outside Peltosaari (families with children, elderly, single and couples)	300
	End of Summer Season Aug 2015	ULL, Peltosaari Association	Residents (families with children, elderly, single and couples)	100
	Fishing event Oct 2015	ULL, Local fishing association	Residents (mainly children)	25
	Restaurant day Nov 2015	Peltosaari Association, Kulttuuriviritys-project, ULL	Residents, also outside Peltosaari (elderly for the most part)	50-100
Networking and "scouting"	Chair and brain gymnastics and neighbourhood walks for seniors Sep 2014 -	City of Riihimäki (services for home help and elderly) and volunteers from Peltosaari Association	Senior residents	Varied between 5-20 (Neighbourhood walks were terminated due to low interest)
	Multicultural café weekly since Nov 2014	Project of Hyria	Mostly immigrants, foreign students	5-10
	Handicraft workshops	SuoMun Kiertävä Muotoilukoulu (association for handicraft and design workshops) summer and autumn 2015	Children, young	10
	Pop-up arts centre Oct-Dec 2015	Kulttuuriviritys-project	Residents (various activities, different demographic groups, mostly children and young)	altogether 100-200

The data from the evaluation questionnaire in 2015 shows that among the respondents the participation rate to the fourteen events listed in the questionnaire ranged between 0 and 61% and the average was 21%. The list included also a weekly summer market which has been arranged in the area continuously before the ULL: there the participation rate was 61% (meaning that 61% of the respondents have visited the event at least once during the years 2014-2015). The lowest participation rates among the respondents were for the following events: Pop-up arts centre events (0%), Multicultural café (2%), Opening of the "Living room" (3%) and Fishing event or use of the fishing place (6%). The figures are not, however, directly comparable because some events on the list were arranged numerous times during the ULL whereas some events took place only once. Furthermore, 69% of the respondents were older than 54 years and thus didn't belong to the primary target group of some of the events. Information about the events had reached 34-78% of the respondents.

The contribution of the activities where the ULL was involved can be considered through a review of types of events and participants that they reached. Already before the ULL, Peltosaari had exceptionally good offering of free leisure activities available, organized by active volunteers. Especially Peltosaari Association has organized numerous events in Peltosaari every year for decades. Most activities of the association are however more suitable for the elderly people and it may also feel difficult for new people to come along in the activities of the close-knit, although welcoming, core group of the association. The ULL therefore emphasised events where it would be easy for whole families and youth to join in. Urban gardening, Midsummer festival, Fishing event and Restaurant day are examples of these new kinds of events that were successful in reaching families and youth in the area. Furthermore, in informal discussions it came out that the Restaurant day and Cleaning day events attracted some people also from the other parts of Riihimäki to Peltosaari and that these visitors admired the liveliness of Peltosaari.

The collaborative way in organizing events and activities resulted in many ways in a greater influence than would have been possible by working separately. The ULL promoted Peltosaari, associations and available premises there for various stakeholders, discussed with people making decisions and offered practical help for the arrangements. This may be the most important long-term effect of the ULL because many activities may continue even after the project has ended. This work also lowered the boundaries between the various stakeholders operating in the area and highlighted the significance of collaboration when available resources are scarce. Several of the activities would have been organized also without the ULL but co-operation in arrangements decreased costs and work load of the partners, created goodwill and strengthened co-operation between the city, volunteers, individual residents and associations.

Improving communication through direct contacts and social media

Emphasis was put on enhancing communication of the plans, activities and events concerning Peltosaari. The first resident questionnaire revealed that the residents mostly learnt about the topical news through the local newspapers and notice boards. Thus the communication through them was continued actively. However, channels for dialogue between the residents and municipal officials were also sought for. The representative of the city of Riihimäki in the ULL team, the project manager of Peltosaari project, participated closely to all events and activities in the area and he used the Living Room for meetings and as a place of work at least once a week. This way he learnt to know a lot of people in the area, heard also coincidentally about the expectations and got feedback. Presence in the area and active involvement of the project manager of Peltosaari project and of some other officials generated a lot of positive response, facilitated effortless interaction and built trust.

As a part of the work also public discussion about Peltosaari was followed in the ULL and participated in, if possible. For example, a concerned resident from Peltosaari had sent a letter

to the editor for the local newspaper. The writer was dissatisfied with the upkeep and cleaning of the Peltosaari area and he requested that the city should take better care of the area so that its image won't further deteriorate. The project manager of Peltosaari project responded to the letter publicly and privately, and agreed that there is need for improvements and in some cases there's a need for clarifying the responsibilities. The discussion continued later on when the writer participated in the Cleaning day and was invited to the panel discussion about the tidiness of Peltosaari in the resident event.

To allow fast interactive communication that is not dependent on place and better able to reach younger people, social media channels for Peltosaari were created (a Facebook site and Twitter- and Instagram- accounts). All kinds of events, regardless of the organizer, have been promoted on the sites. The Facebook site also has provided information about sustainability and energy efficiency and about potential development plans concerning Peltosaari. There have been about 100 status updates between Jan-Nov 2015 on the Facebook site and the site has a couple of hundred followers. Peltosaari Twitter-account has tweeted 21 times during Feb-Nov 2015 and it has 46 followers (2015-12-08). Peltosaari Instagram-account has 10 posts and 11 followers. Typically the announcements and pictures of events on the Facebook site of Peltosaari project have gathered from two to ten "likes". The main site has gathered altogether 183 likes. According to the resident questionnaire made at the end of the ULL the local newspaper and notice boards were still clearly the most used channels to follow communication about Peltosaari (69% and 67% of the respondents respectively) but the Facebook-site was followed already by 23% of the respondents. The questionnaire had a statement "*Co-operation between the residents and the city has improved during Peltosaari project*." 59% of the respondent completely or somewhat agreed with the statement. 55% of the respondents thought that it is easy to get information about the events and leisure activities in Peltosaari (respondents who completely or somewhat agreed with the statement).

In addition to contributing to the interaction with the residents, the communication through Facebook site has also provided wider visibility to the activities and events in Peltosaari: Those people who don't attend the events and even those living far away from Peltosaari may be aware of the events and can see some pictures from them. This strengthens the positive impact of the activities, contributes to improving the image of the area and intensifies even further the positive atmosphere among the residents. This impact is illustrated by a comment on the Facebook-site of Olohuone Riihimäki (Living room Riihimäki) in March 2016:

"you in Peltosaari don't tire of being active, in the past there didn't exist this kind energy, congratulations. I was born and used to live in Riihimäki."

(a public comment on the Facebook site of Olohuone Riihimäki to an announcement of an event, translation by the authors)

Appreciation of the area

Two questionnaires were conducted in Peltosaari among the residents to evaluate the potential changes in how the residents (and people visiting the area) perceive the area. The first questionnaire was carried out in May 2014 and the second in November 2015, in context of resident events in Peltosaari. Figure 10 presents a comparison of the responses in 2014 and 2015 to the most suitable adjectives to describe Peltosaari.

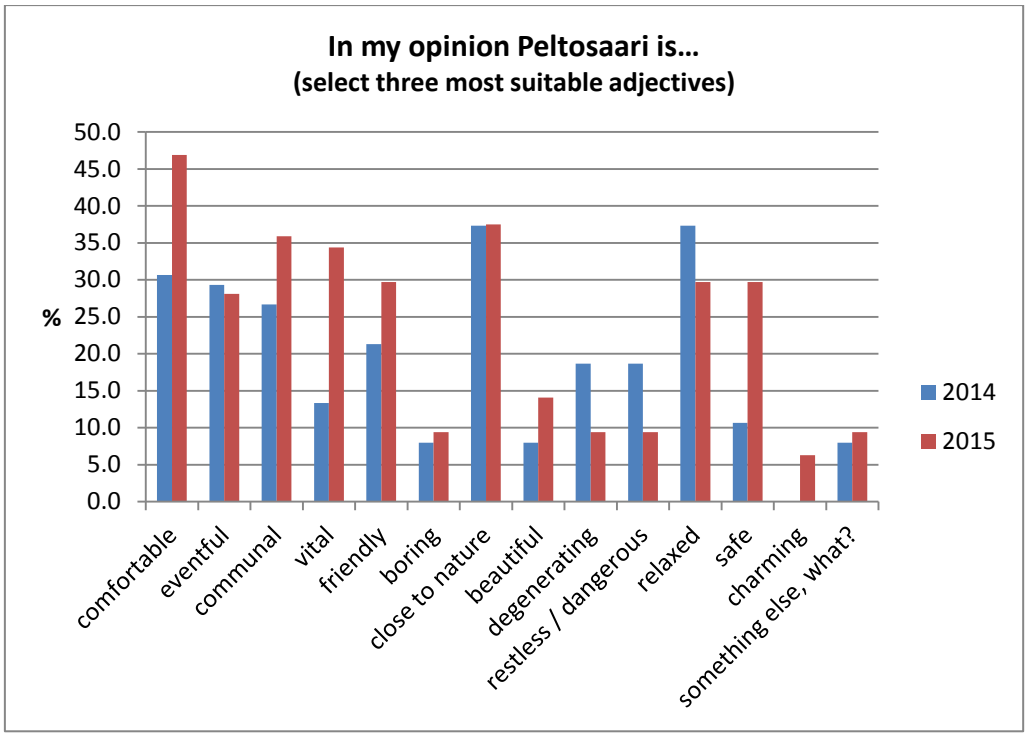


Figure 10. Questionnaire responses from 2014 and 2015: The most suitable adjectives to describe Peltosaari according to the respondents.

The responses of the questionnaire conducted in 2015 probably can't be regarded as sufficiently representative of the general experiences of the residents in the area because the respondents were mainly frequent visitors to the recycling centre of Peltosaari Association and active participators to many events. A wider representativeness was probably obtained for the first questionnaire because the respondents were recruited outdoors, the weather was warm and sunny and a lot of people were on the move in Peltosaari. Furthermore the shares in Figure 10 are not directly comparable since in the second questionnaire many respondents have selected more than three alternatives and these have not been filtered in the results. The impressions of safety in 2015 are also probably affected by the announcement that Peltosaari was awarded "The safe residential environment of the year"-prize just two days before launching the questionnaire. Nevertheless, based on the results it seems plausible that the respondents' perceptions of Peltosaari have become somewhat more positive (a clear increase in adjectives comfortable and vital, decrease in degenerating and restless).

Table 6 presents the categories of the responses to the question about which aspects the residents of Peltosaari appreciate in their living environment. The figures don't highlight any significant changes between the years 2014 and 2015 but it can be concluded that the strengths of the area are: good location close to railway station and services, pleasant sparsely built green area and peacefulness.

Table 6. Number of mentions of each category in the questionnaire responses by Peltosaari residents to the open ended question: "I appreciate the following things in my living environment".

Category	**2014 Questionnaire**	**2015 Questionnaire**
Close to Riihimäki centre, its services and the railway station	18	16
Green areas, closeness to nature	5	10
Peacefulness	7	6

Activities	4	7
City plan, Sparsely built, convenient size	7	4
Other people, friendliness	2	3
Safety	1	2
Opportunities for sports and exercise	5	1
Affordability	6	1
Neighbourhood services	4	0

Improving tidiness of the area was emphasised by the residents in initial interviews, 2014 questionnaire and in the discussion event. Efforts were targeted for the topic in the ULL. In the second questionnaire there was a question "*Has the general appearance and tidiness of Peltosaari changed*?", with the alternatives "Improved", "As before" and "Worsened". 79% of the respondents chose the alternative "Improved", 21% selected "As before" and no one chose "Worsened".

Figure 11 presents the results for the evaluation of statements in the questionnaires in 2014 and 2015. The graph shows the shares of responses with the values 4 and 5 (Completely or somewhat agree) for each statement. The trend is generally positive. Contentment with living in Peltosaari has increased. Also the perceived possibilities to participate in the development and decision making in the living environment have increased.

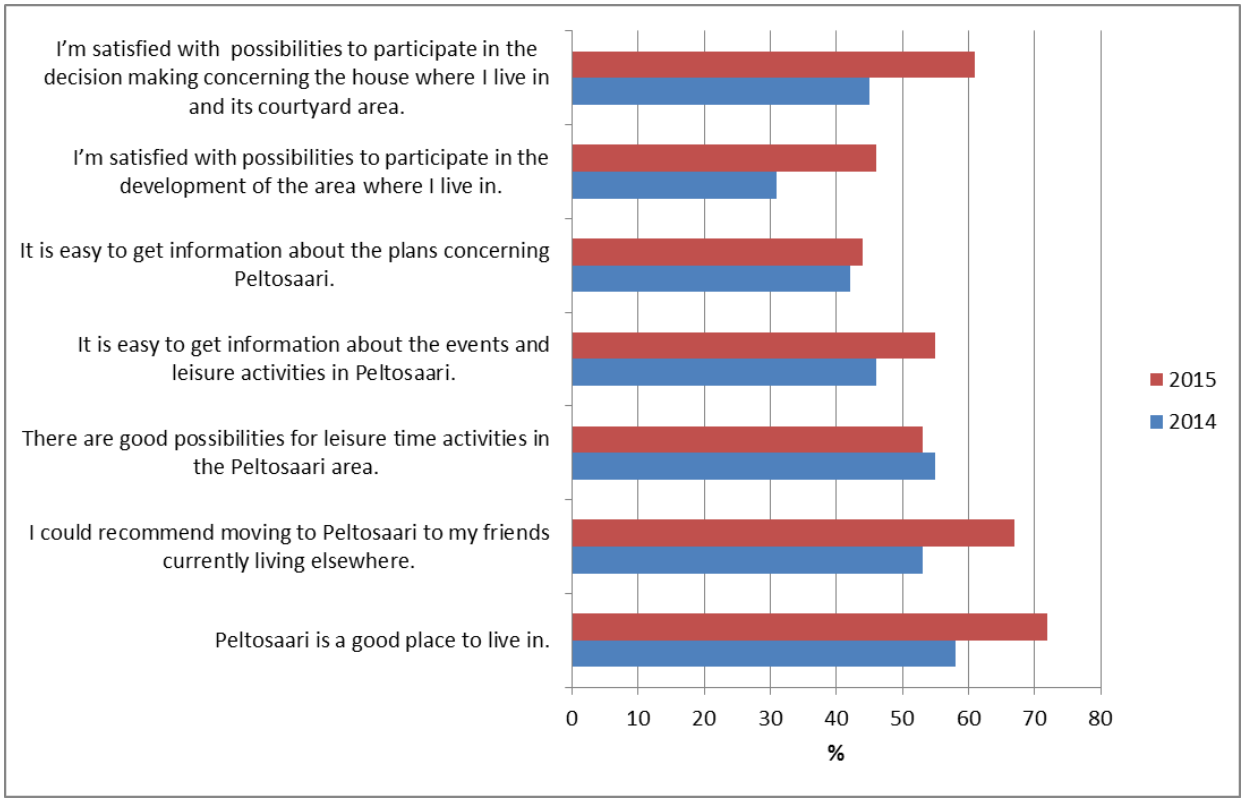


Figure 11. The share of "Completely or somewhat agree"- responses to the statements in the questionnaires.

The questionnaire results indicate that the residents in Peltosaari actually are quite pleased with their living environment; this has been discovered also in earlier studies. A more likely concern is the external impression of the area and a risk for deterioration of the buildings and the outdoor areas.

The image of Peltosaari among those not living there may at least partly be composed of the media publicity. There has earlier been dominantly negative news about Peltosaari but already in the initial interviews of the ULL some interviewees felt that the number of positive news had increased lately. During the ULL the representatives of the local media were frequently contacted and information about the activities and events in Peltosaari was sent to them. Consequently, Peltosaari gained a lot of positive media coverage during the ULL, with articles about e.g. the festivals, arts activities, gardening and progress of construction project (see examples in Picture 4).

There were altogether 18 positive news articles in the local newspaper during 2014-2015 that related to Peltosaari project and/or activities in Peltosaari. During these years there has occasionally been a piece of news in the newspaper informing about untidiness or disturbances in the area. However, several residents, officials of the city and a journalist of the local newspaper estimated that the share of negative articles about Peltosaari has decreased during the last years. Increasingly positive media coverage can be assumed to have influenced appreciation and attitudes of both Peltosaari residents and those living elsewhere. The positive publicity was even further boosted in November 2015 when Peltosaari was granted the *Safe living environment of the year* –award. Justification for the nomination was that Peltosaari has gone through a big positive change. Systematic and effective development work has been conducted in the area during the recent years. The operational model builds on collaboration between the residents, city, companies and associations, which enhances safety and preparedness for implementation. The communities in the area are strongly committed to the goals and the development work.

Picture 4 Examples of media coverage of Peltosaari

Environmental sustainability

Environmental sustainability was not in the focus in the ULL 'Together more'. Impacts on environmental sustainability might however indirectly result from increased availability of local leisure activities: The need to use car or public transport to hobbies outside of own living area could decrease. Furthermore, the activities that were arranged in Peltosaari didn't require a lot of water, energy or other resources, and the objective was to increase the

utilisation rate of the premises in the area. Fishing event and urban gardening for children also included guidance towards sustainable lifestyle.

Economic sustainability

The ULL 'Together more' most likely contributes indirectly to the economic viability of the area in long-term, although this is impossible to assess reliably. Improvements in reputation and the general appearance of the area usually increase prices of the apartments and interests to invest in the area. As a result of the enhanced collaboration between the stakeholders in the area, the utilisation rate of the premises suitable for leisure activities may increase. Additionally, the co-operation in arranging the events and activities was cost-efficient for all parties and it enabled realisation of several events in a larger scale than would have been otherwise possible. There have also been indications that tidy and attractive outdoor environments may decrease vandalism and thus decrease maintenance costs.

Furthermore, it must be emphasised that the value of using Urban Living Lab approach needs to be considered more extensively than with just simple economic measures. Benefits of engaging residents in developing and piloting solutions often follow from "avoided costs", such as early identification of non-working solutions or potential bottlenecks, recognition of emerging challenges and decreasing risk for segregation and degeneration of the area. A question presented by a project team member during the evaluation process underlines this important viewpoint:

"People worry about costs to address sustainability in less valued suburbs, but what are the costs of not responding to the residents' concern about their living environment?"

(a comment by a project team member from the municipality of Botkyrka)

5.4.4 Evaluation of fulfilment of the Urban Living Lab definition

The principle of *Integration of researchers, public organisations and companies to co-develop new solutions* was well complied with in the ULL "Together more": Researchers, municipal officials, residents and representatives of relevant companies and associations were engaged in the ULL in the planning phase, implementation, further development and evaluation. The perspectives of different stakeholders were taken into account in focusing the efforts and building collaboration between the partners. The scope of the ULL was defined based on the initial interviews of the project, first resident questionnaire results, meetings with other projects and associations, and informal discussions. In the implementation phase views of the participants and involved organizers were discussed and learnings from the experiments were gathered so that the events and activities could be continuously developed further. The ULL built on encouraging and supporting operation of many teams and groups in Peltosaari by providing facilities and offering collaboration in implementation if needed. This allowed freedom to present and realize many different kinds of activities. *Learning and exchange of knowledge among the partners* was thus also essential part of the ULL.

Active co-development with residents was aimed at during the whole process. It was learnt, however, in the early phases of the ULL that many residents had become somewhat frustrated with the numerous development projects in the area without substantial progress, what comes to the visible progress in renewal of the area. Furthermore, free ideation of leisure activities was regarded challenging in the initial interviews and the discussions with the residents. Examples and background information were hoped for to support suggesting activities that would be suitable for Peltosaari. Therefore the efforts in the ULL were targeted to implementing field tests and trials with potential activities and getting feedback and suggestions from residents based on those. This approach was advantageous both with respect to motivating residents to participate and to give feedback, and to demonstrate concrete results of the project that were visible to the residents during the project and that had an

impact on their everyday life. The principle *Users as active partners in the development during the whole process* was satisfactorily complied with in the ULL 'Together more'. The most significant shortfall was that the residents were not represented as extensively as aimed at. For the most part a small group of active residents and members of existing associations were engaged in the process. Some of the events in the ULL were successful in that also young people, families with children and other groups that haven't been present in the traditional events in Peltosaari, participated in them. Nevertheless, they couldn't be properly involved in the co-development of the activities but remained mainly as passive visitors.

The approach to conduct numerous field trials and real-life experiments as described above simultaneously supported fulfilment of the principle: *The solution has been developed and evaluated in the real use context*. All of the events and activities and likewise the establishment of the Living room and Fishing place were prepared and implemented in Peltosaari with the idea that they may as well become permanent without major changes, if successful. Therefore the connection to the study was not highlighted unnecessarily; the partners and residents participated in the ULL work as a part of their everyday life in Peltosaari and in true settings.

Increased enthusiasm among the co-operation partners and the positive feedback received of both the individual activities and the progress in the area indicate that participation in the ULL has probably been experienced as *encouraging and rewarding*. The residents have seen changes in the environment and increase in activities in practice during the ULL which can be assumed to have had a significant impact on their sentiments.

5.4.5 Continuation

The ULL established procedures for planning and implementing activities and enhancing co-operation between city and residents. Furthermore it provided examples of successful trials and created a network of collaboration partners, with positive experiences of collaboration. In the planning and implementation of the ULL activities, emphasis was put on finding ways to enable continuation of the activities after the project has ended, if positive results were gained. The collaboration with municipal officials representing various departments, with other projects with suitable focus and especially with organisations currently working in Peltosaari area helps in continuing similar work after the project. The human resources and funding of the project were necessary for introducing the approach and launching the activities but continuing organizing similar events requires significantly less effort. Nevertheless, a contact person from the city with some time allocated for coordinating the work in Peltosaari is needed. Otherwise there is a great risk that the activities and co-operation decline. At the end of the ULL the city of Riihimäki decided to continue the Peltosaari project and the contract of its project manager. Thus continuation of similar efforts and activities seem currently very promising.

Peltosaari Association is at present in a key role as an independent organizer of activities and as an important co-operation partner of the city in Peltosaari area. The volunteers of the association work plenty for the area and also have an active dialogue with the Peltosaari project. The great majority of the members of the association, and especially those actively working in it, are however senior citizens. This concerns the board of the association quite a lot, as it is a true risk for the continuation of many great communal activities in the area. The association would need new younger members to gradually take over the operation, but there seems to be little interest for volunteer work among the younger residents in the area.

5.4.6 Lessons learned and conclusions

The ULL 'Together more' was successful in generating results that the residents experienced in their everyday life. The rapid experiments and pop-up events proved to be a good approach

in engaging residents in Peltosaari. The ULL also contributed to creation of positive atmosphere in Peltosaari and managed to decrease confrontation between residents, various existing groups in the area and the city.

Use of existing meeting places and co-operation with the existing groups in the area facilitated the progress of the ULL. It also increased significantly the potential for the introduced activities to be continued after the project since the ULL was not in the position of the main organizer or funder in many of the events.

An important part of the ULL was active communication. The project manager of Peltosaari project spent a lot of time in the area and participated in the activities, and was thus able to discuss informally with the residents, inform about the ULL and also to build trust among residents. In addition to the websites and social media channels the notice boards in the area were regularly used for informing about the activities. Some feedback still indicated that communication should have been emphasised even more.

Peltosaari gained a lot of positive media coverage in the local newspaper. That has probably had an impact on the appreciation of the area among both the residents themselves and the people living outside of Peltosaari. Similarly the increasing number of updates on Facebook site of Peltosaari support improving the image of Peltosaari: The great number of activities, enthusiastic communities and positive development in the area get through the site visibility that otherwise might remain unobserved for the people not visiting the area often.

The challenges in the ULL related to reaching residents that have not earlier frequently participated in the activities in the area. Some of the organized events attracted also new people to stop by but they didn't contribute to the ULL and their views could not be included for the co-development. The same challenge has been faced also in other ULLs: people are not willing to commit to activities but prefer to join in spontaneously if they happen to have time and interest. New ways for engaging people need to be developed and interactions need to be embedded into everyday life more seamlessly. On the other hand, it also needs to be accepted that not everyone is interested in participating.

It is also good to be aware of potential risks in collaborating closely with existing groups. They may have an established image in the area and the active people there may form a group that is not easy for others to join to. Therefore it is recommendable to consider also other arrangements if especially the residents who are not part of the existing groups are to be targeted. The more evident challenge in Peltosaari is, however, that the operations and activities of Peltosaari Association are mainly run by volunteers aged 65 or older. The association is very important for the area but it will need new members to be able to continue.

In the ULL responses to the questionnaires were obtained almost completely via paper forms by asking personally passers-by in Peltosaari to respond. This raises some concern of the representativeness of the responses but also of potential bias. The discussions with the researchers and returning the questionnaire forms to the box beside the researchers may have affected the responses. An interesting setting for a research would be to compare responses obtained through internet with the responses where face-to-face discussions have taken place. Unfortunately this was not possible in this study due to the small number of online responses.

6 MAIN CONCLUSIONS AND LESSONS LEARNED

Evaluating social sustainability impacts and demonstrating cost effectiveness of an ULL requires development of new methods or approaches

Based on the ULLs carried out in Alby and Peltosaari, it is evident that considerable focus has been directed to the social dimension of sustainability in these two areas. In Alby, the objectives of the ULLs include increased sense of security, increased interest in and knowledge about urban gardening, increased engagement among residents and trying new working methods in the municipality. The Peltosaari ULLs focused on, for example, creating inexpensive activities for the residents in the area, enhancing the dialogue both between the residents representing various existing groups in the area and between the residents and the municipality, as well as enhancing communication between the city councilmen and the municipal officials.

At the same time, the evaluation of the ULLs within SubUrbanLab reveals the challenge of evaluating and measuring "soft" impacts related to social sustainability and participation in suburban areas. These challenges are related to aspects such as:

1) the objectives often relate to peoples experiences and perceptions, e.g. of influence, communication or security, which are more difficult to measure;
2) the impacts are often perceivable in the long-term, especially changes in attitudes and processes, and are hence difficult to evaluate within the timeframe of a project such as SubUrbanLab;
3) the impacts of an ULL are difficult to differentiate from other external influences or events as there are several activities ongoing in a suburb potentially having similar kinds of effect.

Nonetheless, these impacts are just as important to highlight as the more quantitative impacts that are easier to measure, such as savings in energy or reduced GHG emissions.

Moreover, an intrinsic part of the ULL approach is that the course of an activity may change during the process, based on the contributions and decisions among the participants. This complicates the evaluation since the objectives, and thus evaluation methods or approaches, may need to be adjusted during the process.

The challenge of evaluating social sustainability impacts has further implications. As many impacts are difficult or unsuitable to quantify, they are also more difficult to assess in monetary terms. This in turn makes it difficult to examine the cost-effectiveness of a multi-stakeholder approach such as ULL. Nevertheless, demonstrating sustainability impact is important in order to motivate, for example, municipalities and housing companies to increase user and stakeholder involvement in the whole process of modernization and uplifting measures. Decision makers need more evidence on the impacts and benefits of co-creation and co-design. Hence, methods and procedures for evaluating sustainability and co-creation impacts are an important field for further work and research.

At the same time, it is also important to further broaden the understanding of the value of the ULL approach and to base it on different kinds of criteria than just simple cost-efficiency of implementing concrete actions. Engaging people and setting up co-development processes are time-consuming and require resources, but on the other hand, the outcomes of all Urban Living Labs of the study were significantly and positively affected by the participation: similar results could not have been achieved without the Urban Living Lab approach.

Involvement of municipalities and residents in development work related to uplifting and sustainable development in suburbs is crucial

The ULLs in SubUrbanLab have been developed against the backdrop of participants' goals. Yet, in practice, this has often been very similar to society's collective goals, as expressed through municipalities and residents. Sustainable development in suburbs is indeed closely linked to society's collective goals. Engaging municipalities provides opportunities to create long-lasting development networks, since municipalities usually have enough resources to work for a common good. ULLs can also support interaction between municipalities and residents, giving residents a feeling that they are being listened to, particularly important in suburbs, where a relatively large share of the population can be described as marginalized. Turning ULLs into mainly user-driven ULLs run by the residents might increase their feeling of inclusion and participation in society. User engagement can be further encouraged by addressing particularly noticeable sustainability challenges in the suburb and allowing people to express themselves on issues that already engage and interest them (Buhr et al., 2016).

The decision-making structures of public sector have an impact on the ULL process and function

ULLs offer an alternative to other forms of governance by providing participatory possibilities, which go well beyond common dialogue practices on local levels in order to address particular social and environmental issues. However, the experiences from SubUrbanLab in working with the public sector (such as the municipality of Botkyrka and city of Riihimäki) shows that existing decision-making structures, as well as the habit or culture of public participation within public organizations, influence the ULL process and function, especially when the implementation is dependent on public (municipality) decision-making. For example, in ULL 'Vacant Space Alby' changes in the political context in the municipality and priorities among decision-makers during the ULL process resulted in that no decision has been made (so far) on the potential implementation of temporary uses of the vacant space co-created within the ULL. This in turn can have consequences on the long-term impact of the ULL, e.g. in terms of making the ULL approach a new working method in the municipality and on commitment and trust among residents. In ULL 'Energetic co-operation' in Peltosaari, a principle decision to be involved in the ULL had been taken by the public housing company. However, as the ULL proceeded, a lack of reallocation of resources (budget and working hours) and difficulty among management and staff in adapting priorities hindered the ULL process. By contrast, in the ULL 'New Light on Alby Hill' a formal decision on the renewal of street lighting had already been taken by municipality decision-makers together with a designated budget. This facilitated the ULL process and the implementation of the new lighting.

Hence, an important insight from these experiences is that it is vital to have the decision-makers' acceptance for the ULL process and results already from the beginning, but also that the solution/action to be developed within an ULL needs to be mature enough in the municipality (or the relevant stakeholder) with certain decisions already made (e.g. budget allocations). The challenge is then, however, to select actions for an ULL where some necessary decisions have already been committed to, but are not yet too fixed to motivate participation and to be open for new or alternative ideas from users and stakeholders during the whole process.

Another experience of carrying out ULL involving the public sector is the consideration of institutional and cultural preconditions in the public organization. It has been evident in SubUrbanLab, especially when comparing the Swedish and Finnish ULLs, that the habit or culture of public or stakeholder participation of the public sector is important in order to facilitate an ULL. In Alby, where the municipality has a long tradition of involving its citizens and other stakeholders in decision-making, the acceptance and understanding of the

ULL approach was more straight-forward than in Riihimäki, where the tradition of participation was not as explored. The Peltosaari ULLs hence needed more work and time to discuss the ULL approach and resident/stakeholder participation *per se* before planning and setting up the ULLs. Also, challenges of communication, collaboration, and coordination between departments (in order to create cross-administrational cooperation) may be more evident in public organizations compared to the private sector.

To conclude, the working methods of an ULL, dependent on public (municipality) decision-making, need to be fully embraced and integrated into existing organizational routines and structures.

How to encourage earlier involvement of users in the ULL process needs to be further considered

The evaluations of the ULLs in Alby and Peltosaari reveal that the project definition on an ULL has been met to different degrees by the different ULLs. Some joint challenges with the ULL approach can be identified. For example, most of the ULLs struggled with the involvement of users and stakeholders, especially in the earlier phases of developing and planning the ULL. There were also challenges to create continuous overall commitment among targeted users and stakeholders. Although the ULLs have integrated a variety of stakeholders and organizations in the co-development of new solutions and ideas, few lived up to the feature of having the *users* of the developed solutions and ideas as active partners during the entire processes (see ULL features in chapter 3.1.2). The development and planning processes of the ULL integrated to a larger extent other stakeholders than users, while users were more involved in the implementation and evaluation processes. It should be noted here that, although ideal, it is often not practically possible (or motivated) to include all relevant users and stakeholders in all stages of an ULL. For example, it can be difficult to know beforehand the most relevant users and stakeholders, but it is also, as shown evident during the SubUrbanLab-project, difficult to get a long-term commitment of the users and stakeholders to the ULL already from the start. This has been a practical challenge also for many other ULLs (see e.g. Juujärvi & Pesso, 2013; McCormick et al., 2015). However, perhaps the Alby and Peltosaari ULLs would have had developed differently if it had been possible to engage more users and stakeholders at an earlier stage in the process. A field for further research is how to carry out and encourage more efficiently earlier involvement.

The ULL approach as well as the aspects of specific ULLs in Alby and Peltosaari has potential for up-scaling in other suburban areas in Europe.

Previous research has argued that ULLs carried out in particular places at particular times in the real world are difficult to be up-scaled and to generate generally valid knowledge to be copied to other cities and regions (see e.g. Evans & Karvonen, 2010, 2014).

The SubUrbanLab project and its six different ULLs implemented in two very different suburban areas have shown that, when taking into consideration ULL boundary conditions and limitations (see e.g. Friedrich et al., 2013), the ULL approach can be successful in addressing a variety of modernization and uplifting needs in less valued suburbs, together with residents and other stakeholders. We would hence like to argue here that the ULL approach has potential for up-scaling in other similar suburbs in Europe and that the lessons learned from SubUrbanLab project can be helpful actors in other European suburban areas interested in trying the ULL approach. The described ULL processes from Alby and Peltosaari and the six different examples of modernization and uplifting actions to which the ULL approach have been connected, furthermore provide inspiration and insight for other areas on how to develop, plan, implement and evaluate an ULL. Moreover, the evaluation of the ULLs in Alby and Peltosaari has shown that the specific actions, such as urban gardening, carried out within the ULLs have potential for up-scaling both in Alby and Peltosaari but also

to other suburban areas. If the ULLs were to be developed further and up-scaled to other suburbs, the ULLs would have potential for a more significant impact on sustainability, both short-term and long-term.

The exact utilization of the ULL approach and development and implementation of actions, such as urban gardening or intra-neighborhood relations, however depend on the local context where it is applied and the involved residents/stakeholders.

To enhance up-scaling of the ULL approach and share best practices & lessons learnt in the SubUrbanLab-project, the project group has compiled these important aspects to an easy-to-read booklet, which will be used to disseminate the results to a wide European and international audience. The booklet can be uploaded from the SubUrbanLab website (www.suburbanlab.eu).

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